

**THE  
RAILWAY GAZETTE**

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## ELECTRIC RAILWAY TRACTION

A Supplement illustrating and describing developments in Electric Railway Traction is presented with each copy of this week's issue.

## Railway Officers and Overseas Visits

THE General Manager of the South African Railways, in his report for the year ended March 31, 1937, referred to the value of overseas visits, in which investigations are made by responsible officers into the practice of railways in other countries. During the period dealt with in the report, and arising out of certain recommendations made by the Granet Commission in 1934, arrangements were made for a delegation of senior officers of the South African Railways to visit Europe and America. These officers visited the larger railway centres in Great Britain, on the Continent of Europe, and in the United States and Canada. They made comprehensive investigations into aspects of railway working falling within their respective spheres, and the mass of information they obtained should be of great value to the administration. Apart from this, the report says, officers are sent overseas to congresses and other meetings on railway subjects, and advantage is also taken of the presence overseas of an officer on leave of absence to allow him to inquire into questions affecting his particular department. The practice referred to by the General Manager of the South African Railways is of course not by any means new, and railways in other

countries, including those of Great Britain, have for many years past organised and encouraged overseas visits by departmental officers, whether to congresses and meetings or as special journeys with definite objects. For our own part, we may say we have always welcomed the visits to this office of responsible officers from overseas, and we hope these have proved of mutual advantage.

\* \* \* \*

## Southern Sales

The successful working of the Southern Sales League during its first month, to which Mr. Robert Holland-Martin referred at the meeting of the company on February 24, is apparent in the February issue of *Southern Sales*. Articles in this publication by officers of the railway and others direct the attention of the staff to fruitful sources of revenue. Among these at the present season is football match traffic, in which connection it is remarked that at Charlton station on an average 250 more persons return home by rail after a match than arrive by train to see it. This is taken as a compliment to the convenience of the Southern services when it is desired to "reach that armchair by the fire in the shortest possible time." Another contributor, who makes a hobby of organising party outings by rail in the Amberley district, describes his method of work and the friendly relations he has established with his *clientèle*. So far, the London West Division leads in the passenger competition with 100 per cent. of its quota, and the London District heads the freight table with 107 per cent. Evidence of Southern Sales enthusiasm also reaches us from outside sources, as in the example of the restaurant car steward who, to the obvious appreciation of passengers, audibly announced the names of the liners visible from the train between Southampton and Millbrook.

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## The Week's Traffics

Disappointing merchandise traffics are mainly responsible for the increase of only £14,000 shown by the combined receipts of the four main-line companies for the past week. Coal traffic increased £37,500 and passenger train traffic £4,000, but merchandise traffic fell £27,500. The combined increase for the year to date is now £790,000 an aggregate takings of £23,134,000 or 3.53 per cent. Total takings for the past week were L.M.S.R. £1,197,000, L.N.E.R. £909,000, G.W.R. £487,000, and Southern Railway £368,000.

	8th Week				Year to date	
	Pass., &c.	Goods, &c.	Coal, &c.	Total	Inc. or Dec.	%
L.M.S.R.	+ 3,000	- 12,000	+ 17,000	+ 8,000	+ 317,000	+ 3.48
L.N.E.R.	- 2,000	- 9,000	+ 9,000	- 2,000	+ 283,000	+ 4.20
G.W.R.	- 1,000	- 5,000	+ 12,000	+ 6,000	+ 133,000	+ 3.57
S.R.	+ 4,000	- 1,500	- 500	+ 2,000	+ 57,000	+ 2.05

Great Northern (I.) traffics for the past week, totalling £16,250, show a decrease of £1,050; Great Southern, totalling £64,543, a decrease of £3,302; and Belfast and County Down, totalling £2,117, a decrease of £99. Mersey Railway receipts total £4,132, an increase of £120.

\* \* \* \*

## A New Era for the Mersey

Replying to shareholders' questions at the annual meeting of the Mersey Railway last week, Mr. John Waddell, the Chairman, said it might not be generally realised that the forthcoming through running with the L.M.S.R. Wirral Section would entail much wider activities for their company, as they were to be responsible for the working to and from New Brighton, while L.M.S.R. trains would provide the Hoylake services. Mr. Waddell said it was very difficult to estimate the extra traffic to be expected

from these new arrangements, which take effect on March 14, but he quoted some figures of increases secured after a previous Mersey Railway development—the electrification of 1903. In the last year of steam working, 1902, the number of passengers travelling on the Mersey Railway was about 6½ millions per annum. In the next three years that figure was almost doubled. At present about 2½ million passengers travel between the Wirral Section and Liverpool in a year. Mr. Waddell considered it might not be quite fair to expect another doubling of the figures in three years, as eliminating the change at Birkenhead Park was not absolutely comparable with the difference made by substituting electric trains for the discomforts of underground steam working.

\* \* \* \*

#### Franco-Hellenic Railway Results

The annual report of the French company operating the Franco-Hellenic Railway of Greece, shows, for the year 1936, very little variation in the gross receipts, as compared with 1935. A slight reduction occurred in merchandise traffic, due to poor crops following upon excessive rains. In passengers, on the other hand, there was some improvement, both in local and excursion traffic, and in the international through bookings. The number of passengers increased by 18,352, and the goods traffic, including luggage and livestock, was 6,746 tons less. The principal working statistics were as follow:—

	1936	1935
Length of line open, km. . . . .	170	170
Train-kilometres . . . . .	258,331	256,660
Passengers, number . . . . .	180,968	162,616
Goods, including luggage and livestock, tons . . . . .	102,398	119,144
Passenger receipts . . . . .	13,086,254	11,718,649
Goods receipts . . . . .	20,358,334	21,505,762
Gross receipts . . . . .	38,214,606	38,380,616
Working expenses . . . . .	25,676,760	24,901,775
Ratio of working, per cent. . . . .	67.2	64.8

The profit and loss account shows a net profit of fr. 2,105,591, from which is deducted the statutory reserve of 5 per cent., amounting to fr. 105,280, leaving a balance of fr. 2,000,311, out of which a dividend of 5½ per cent. was paid on the "O" shares, and 2 per cent. on the "P" shares. The council of administration takes 10 per cent., and the remainder of fr. 688,780, with the amount brought in, makes a carry forward of fr. 7,196,521. The three diesel-engined railcars were delivered too late to be put into service during the year under review; these German units were described and illustrated in our Diesel Railway Traction Supplement for July 9, 1937.

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#### At 4 p.m. from London to Glasgow

In response to a persistent public demand that the citizens of Edinburgh and Glasgow may have the opportunity, hitherto denied them, of attending evening functions in each other's cities and still be able to get back home the same night, the London & North Eastern Railway has now seen its way to provide, from March 1, a couple of late evening trains, one leaving Glasgow for Edinburgh at 10.40 p.m., and the other leaving Edinburgh for Glasgow at 10.30 p.m. The immediate justification for the new trains is the Empire Exhibition at Glasgow, and it will doubtless depend on the subsequent patronage whether the new service becomes permanent. The Edinburgh—Glasgow train will also in some measure provide an answer to the oft-repeated request for a service by the Coronation streamline express from London to Glasgow. It will now be possible to leave London at 4 p.m., two hours later than ever previously possible, and be in Glasgow the same evening at 11.39 p.m.—a

convenience that not a few Glasgow business men will appreciate, even though it may involve a wait of 30 min. in Edinburgh and a very late arrival in Glasgow—for it will give them almost the entire day for business in London before leaving.

\* \* \* \*

#### End of a Channel Islands Steamer

When launched at Clydebank in 1896 for the London & South Western Railway, the little steamer *Victoria* was regarded as a smart vessel of her type, although the services for which she was designed—the mid-day run from Southampton to the Channel Islands and between the islands and France—did not demand either the size or the speed of consorts on the main lines. She was a twin-screw steamer of 709 tons gross, with triple-expansion engines giving a speed of 17 knots. The licence allowed over 400 passengers to be carried, and there was sleeping accommodation for nearly 100, in addition to good stowage for special cargo. The vessel ran regularly on the Channel Islands services until the summer of 1914, when she was one of the first merchant ships to be taken up by the Admiralty. The *Victoria* was actually commissioned and paid off before the outbreak of war, but soon afterwards was re-commissioned and remained in Government service until after the Armistice. During the war the vessel was renamed *Surf II* in order to avoid confusion with other vessels. When paid off the vessel was surplus to the railway's requirements and was offered for sale early in 1919; after being withdrawn at the auction without a bid, she was sold privately for about £18,000 and transferred to the James Dredging Towing & Transport Company, who sent her to the Near East. For a time she ran in Turkish waters and the Black Sea, and then had other owners. Recently, she was sold to other Greek interests and has now gone to the shipbreakers.

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#### The Hindolvestone Derailment

Major G. R. S. Wilson, in his report on the derailment on August 20 of a Leicester—Norwich express between Hindolvestone and Guestwick, on the Midland & Great Northern Joint line from Melton Constable to Norwich, summarised on page 439, expresses the opinion that the cause cannot be specified with certainty. There was no speed restriction at the spot and the train was probably travelling at about 60 m.p.h. The curve is located on a soft formation, and there appears to have been more difficulty in keeping the track in good order than was appreciated by those concerned. There was irregularity in the cross level of the track, and apparently alignment was not all it should have been; complaints had been received from drivers of rough travelling. These irregularities, combined with the speed, the rather worn state of the leading coach, and probably the weakened condition of the intermediate drawgear spring on the locomotive, combined, in Major Wilson's opinion, to produce a sudden excess of lateral oscillation which caused the leading tender axle to leave the rails; the coaches very soon followed it and broke away. The engine itself kept the rails. There were 16 passengers but fortunately only two were slightly hurt.

\* \* \* \*

#### The A.T.C. Problem and the Future

A question in Parliament, reported on page 232 of our issue of February 4 shows that very confused ideas are current about the A.T.C. equipment now in use in this country. The Great Western apparatus admirably performs the functions it was designed to fulfil, but statements often to be seen in the non-technical press such

as "every train automatically blocks the line behind it," or "it is impossible to run past a danger signal on the Great Western," are, of course, erroneous. From these notions has arisen a tendency, seen in the instance quoted, to suggest that other railways are indifferent to safety because they have not installed identical mechanism and that they should be compelled to do so. This problem is far from being so simple as it may appear to the lay mind, and seeing that a large sum would be required to instal a plain distant signal system like that of the Great Western it is natural that other railways should carefully review the later and more comprehensive developments of this rapidly advancing science before committing themselves to such heavy expenditure. The ultimate equipment of all important lines with track circuiting, multiple aspect signals, and continuous cab signals, in an endeavour to meet the fog difficulty with the maximum efficiency once and for all, is far from being a mere ideal. This type of signalling is actually being tried at the present time between Caen and Cherbourg on the French National Railways, as explained in Monsieur J. Walter's article in this issue, and the policy of track circuiting all main routes, now being steadily pursued in France, opens the way to a wide use of continuous cab signalling if these trials should prove successful.

\* \* \* \*

#### Building or Rebuilding?

Locomotive engineers are not all in agreement as to whether the wiser motive power policy is, on the one hand, a short life for locomotives, in order that by new construction the whole of the locomotive stock may be of as up-to-date design as financial conditions permit, or, on the other hand, large-scale modernisation of the older locomotives, so that they may be adapted to modern needs without new construction. Few countries have been so successful in the latter policy as France. The Chapelon researches have made it unnecessary for the Paris-Orleans-Midi Railway to build any new locomotive stock for years past, and by reconditioning engines of earlier types have provided, not only the P.O.-Midi, but also the Est and the Nord with locomotives that are in the very forefront of technical locomotive development. Similarly the P.L.M. and Etat have been busy on the modernisation of earlier types; for example, the fastest long-distance steam service on the P.L.M. is being worked by 30-year-old Atlantics which have been adapted for continuous steaming at high speeds and streamlined. So successful has been the reconditioning that this *train aerodynamique* of the P.L.M., with its 59.5 m.p.h. average for the 535-mile journey from Paris to Marseilles, inclusive of five stops, is being operated on a coal consumption of 28 lb. to the mile, which suffices for sustained 75 m.p.h. speeds, both on the level and up 1 in 333 and 1 in 200 grades, by these 74-ton Atlantics with their 210-ton train.

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#### Clean Engines

A clean engine is an advertisement for its owner, especially if it is painted in an attractive style. That the blue streamlined Pacifics of the L.N.E.R. with their beautiful Gills Sans lettering and the minimum of irrelevant decoration are a constant source of pleasure is borne out by the steady gaze they attract from onlookers of all sorts. It must have something to do with their handsome appearance that they are almost invariably clean, a sign that they engender pride in those who are charged with their care. Although the Southern Railway possesses no such spectacular locomotives, its stud of good-looking green engines attracts general attention from travellers on that line, more so now probably than ever before, for the

reason that the Southern has of recent months greatly improved the standard of cleanliness of its rolling stock. It is safe to say, indeed, that, though the acme may not yet have been reached, the Southern heads the list of British railways in this respect, particularly with its engines. By whatever means this creditable eminence has been achieved, the Locomotive Running Department deserves the thanks not only of the travelling public but of the whole staff, to whom the sight of well-kept equipment must be a constant inspiration.

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#### Mr. Stanier on Boiler Characteristics

During the discussion which followed the reading of Mr. A. F. Webber's paper on "Proportions of Locomotive Boilers" at a meeting of the Institution of Locomotive Engineers in London, some interesting points arose in connection with the design and performance of certain specified locomotive boilers. Mr. W. A. Stanier, Chief Mechanical Engineer of the L.M.S.R., drew attention to the subject of balancing the areas through the small tubes and those through the large flue tubes of the boiler, and stated that on the 4-6-2 *Coronation* engine, the area through the small tubes is 3.23 sq. ft., and through the large tubes 3.66 sq. ft., making a total of 6.89 sq. ft. On the "5X" 3-cylinder engines, the figures are 2.22 sq. ft. and 2.52 sq. ft., making a total of 4.74 sq. ft. The difficulty, as he pointed out, was to obtain the free areas required, and yet maintain a balance with the grate area and the firebox volume within the loading gauge from which railways in England suffer. In connection with the "5X" engines, Mr. Stanier referred to the accelerated train trials carried out by the L.M.S.R. between Glasgow and Leeds, and Leeds and Bristol with the "5X" class. With a train weighing 300 tons, the coal consumption varied from 40 lb. to 100 lb. per sq. ft. of grate area per hr., and this, he thought, indicated the extraordinarily flexible steam raising characteristics of a locomotive boiler, a finding with which all who study the question will be in full agreement. He did not advocate an engine being used to burn 100 lb. per sq. ft. of grate area per hr., because with some of the larger engines, it would necessitate introducing mechanical stokers.

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#### Geared Steam Locomotives for Egypt

Elsewhere in this issue we give a description of a new departure in main-line passenger locomotives originating in this country but finding service application in Egypt. On previous occasions we have described shunting and goods locomotives with individual drive by Sentinel geared engines, but the new development represents a combination of the well-tried Sentinel engine with standard railway practice as regards the boiler and framework. Many claims are made for the combination, and we do not doubt that important advantages will accrue from the utilisation of all-enclosed, bath-lubricated working parts in accordance with automobile practice. There can be little doubt that in ordinary working a heavy price is paid on account of wear and tear for the privilege of having such parts in constant view, especially in a country like Egypt. As regards the claim that the system reduces track maintenance by eliminating hammerblow we feel a little dubious. Hammerblow is certainly objectionable, but the axle-hung power unit, be it steam or electric, imposes strains on the track which many railway engineers would consider with no more favour. The employment of rotational speeds in excess of any obtaining with orthodox designs is an advance of the highest importance and we are not surprised to learn that large economies in steam have resulted from speeding up the working cycle.



## The Indian Railway Budget

**T**HE Railway Budget was introduced in the Indian Central Legislatures on February 14 by Sir Thomas Stewart, Member for Railway and Communications in the Legislative Assembly, and by Sir Guthrie Russell, Chief Commissioner of Railways, in the Council of State. Sir Thomas Stewart had the good fortune to assume charge of the Railway Department when the Indian railways had emerged from the trough of depression which had given his predecessors in office the difficult task of presenting deficit budgets in the Assembly; consequently his first Railway Budget disclosed a substantial surplus. In February, 1937, Sir Muhammad Zafrulla Khan's budget anticipated a surplus for the year ended March 31, 1937, of only Rs. 15 lakhs (£112,500), but the unexpected improvement both on the receipts and on the expenditure sides in the closing months of the year raised the actual surplus to Rs. 1.25 crores = Rs. 125 lakhs (£937,500). This sum was transferred to the Depreciation Fund in repayment of part of the debt to the fund. The revised traffic receipts for 1937-38 are now expected to be Rs. 94.25 crores, roughly £70 million, or about Rs. 2½ crores better than for the year 1936-37 and Rs. 3½ crores more than the original budget estimate. Naturally, the working expenses are also put at a higher figure, exceeding the actuals for 1936-37 by Rs. 1.38 crores and the budget estimate by Rs. 79 lakhs. After meeting working expenses, the net receipts are estimated to be Rs. 1.08 crores (£810,000) higher than last year. Taking into account the betterment under miscellaneous receipts, the total net revenues for all State-owned railways are now placed at Rs. 32.07 crores or £24 million. Out of this sum, Rs. 29.24 crores, or nearly £22 million, will be absorbed in interest charges, leaving a revised surplus of Rs. 2.83 crores, or a little over £2 million, in place of the Rs. 15 lakhs (£112,500) originally budgeted. This surplus will be credited to the general revenues as it has been decided, with the approval of the Legislature, that railway revenues should not be called upon to meet liabilities to the Depreciation Fund or arrears of contribution to general revenues for a period of three years.

One noticeable feature of the working of railways during the year was the steady increase of passenger and goods traffic during the first seven months. The number of passengers carried on all Class I railways increased by about 9 per cent., and passenger-miles increased by 10 per cent. As regards goods traffic, except in the case of oil-seeds and cotton, the figure for each of the principal commodities carried on the Indian railways showed an increase of about 9 per cent. and the ton-mileage about 14 per cent. The average load per ton was 204 miles. But whereas the improvement in passenger earnings has been well maintained and shows little sign of falling off, there has been a marked deterioration in goods earnings since November last, the most disappointing factor being the poor cotton traffic. The increase in working expenditure is due mainly to the increase in the price of coal and in the consumption of more costly stores necessitated by increased traffic, and also, in part, to the reconditioning of wagons and increased repairs to rolling stock.

In view of the experience of the past two months during which railway receipts have shown a deterioration of Rs. 1½ crores (£937,500) in comparison with the corresponding period in the last financial year, the Railway Board does not feel justified in being too optimistic in regard to the estimates of traffic during the coming year. Traffic receipts for 1938-39 are, therefore, placed at the same figures as in the revised budget for the current year, namely Rs. 94½ crores. It is expected that passenger earnings will not fall below the level at which they now

stand, and that a certain amount of traffic, in cotton for instance, held back this year in the absence of favourable prices, may be carried over to next year. It is also expected that on account of the increased price of coal and stores, there will be an increase of about Rs. 50 lakhs under working expenses. Interest charges should be practically the same as in the current year. It is estimated that the net result of the year's working will show a surplus of Rs. 2.56 crores against a surplus of Rs. 2.83 crores in the current year. The surplus will again be paid to the central revenues in accordance with the present arrangements. The appropriation to the depreciation fund during 1938-39 will be Rs. 12.57 crores and the withdrawals should be about Rs. 6.65 crores, and the balance in the fund at the end of the year will be over Rs. 24½ crores, or approximately £18½ million.

The new works programme for 1938-39 involves a total expenditure of Rs. 12.75 crores, of which Rs. ¾ crore will be met from stores in stock and the balance will be further reduced to Rs. 11 crores by a credit for material returned from works. Following the precedent of previous years, actual provision under this head is reduced to Rs. 9.40 crores as it is generally found that there are unforeseen delays in the completion of works with a consequent reduction in expenditure: of this expenditure, only Rs. 2.75 crores will be a debit to capital. A sum of Rs. 55 lakhs is provided for the construction of three new lines in Sind, which are all required for the transport of produce expected from the development of the Lloyd Barrage project. These railways are (1) the Sind Right Bank feeders from Larkana to Jacobabad, (2) the Khadro—Nawabshah and (3) the Pithoro—Tando Mithakhan railways.

The rolling stock programme is estimated to cost Rs. 4½ crores. The rise in the price of iron and steel has inevitably affected the outlay on this account. Last year it was proposed to purchase 2,000 general service wagons, but in view of the upward trend of prices and difficulties about prompt delivery, the Railway Board decided as a measure of prudence and economy to enter into contracts with Indian wagon building firms for the supply of 6,095 wagons, spread over three years. 2,095 wagons are due for delivery in 1938-39 and will cost Rs. 104 lakhs. In order to be in a position to purchase the types of locomotive most suitable to Indian requirements, a certain number of experimental types has been ordered. These will be fully tested before any extensive purchases are made. A substantial sum will be spent on the renewal of inter and third class coaching stock. The new coaches will be substantially of the design approved by the Central Advisory Committee.

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## Railway Cruising Activities

**T**HANKS to the initiative of the steamship companies, cruising is now proving extremely popular with holidaymakers. The British railway companies have not been slow to use their steamboats for this purpose when they could be spared from their regular services. Thus the L.N.E.R. frequently runs week-end sea cruises from Harwich in summer, while the Southern Railway operates mid-week and week-end cruises from Southampton. The size of the G.W.R. fleet does not permit of any such ambitious cruises, but a very extensive business is done in day trips from the Great Western resorts on the South Coast to such places as the Channel Islands, and Cherbourg, while afternoon and evening cruises along the coast from Weymouth or Plymouth are patronised annually by thousands of visitors. Although the word "cruise" is instinctively associated with the sea, the G.W.R. has for



over ten years arranged "land-cruises" among the places of scenic beauty or historic interest in Western England and Wales. Travellers travel first class by rail to the point whence the cruise proper begins by motorcoach, supplied by one of the company's associated motor undertakings, and return home similarly. First class hotel accommodation is reserved in advance, and every tour is accompanied by one of the company's representatives. The fares for the tours, which usually last six days, are inclusive of all transportation, hotel accommodation and meals, gratuities, and admission fees to places of interest visited. In short, the cruises have been planned to provide for the maximum of sight-seeing without fatigue. When desired, arrangements can be made for passengers from any station in Great Britain to join the tours, or for the cruise to be taken without the rail journeys. Such cruises, although their patronage is, for obvious reasons, fairly limited, have publicity value in the possibility of participants being attracted to pay further and more extended visits to the places they see.

A rather more elaborate land cruise, arranged by the L.N.E.R., runs on three or four dates during the summer. Introduced several years ago under the title of the Northern Belle, a complete train is run from London to tour Scotland. It is composed entirely of first class accommodation, equipped for day and night travel, and passengers are allotted a numbered and reserved seat in the restaurant car and an exclusive cabin in the sleeping car. The train also includes a lounge saloon, buffet, hair-dressing saloon, and shower baths, while arrangements are made throughout the tour for the supply of newspapers, and the sale of stamps and other incidentals. The cruise embraces some of the most beautiful scenery in the Highlands, road and steamer trips being made when necessary to reach resorts away from the railway. This year passengers will have the added attraction of a visit to the Glasgow Empire Exhibition.

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### The Barbados Government Railway

THE Barbados Railway, 24 miles long and of 2 ft. 6 in. gauge, was taken over by the Government in 1917, and the accumulated annual losses on working to December 31, 1936, amounted to £66,326, without taking into account any interest on the capital cost of the line. With improved roads and an ever increasing number of motor vehicles the position of the railway gradually became more critical until in January, 1934, passenger traffic ceased altogether and the section between Bathsheba and St. Andrews (miles 20 to 24) was closed to goods traffic in May, 1934. In view of the continued losses in traffic and the condition of the line generally, it was resolved in February, 1937, to obtain an independent opinion, and Mr. E. M. Bland, former General Manager of the Nigerian Government Railway, was asked to report on the position generally. Mr. Bland's report was published in the *Official Gazette* at Bridgetown on September 27, 1937. The report gives exhaustive details of the state of the track and equipment (both requiring urgent repairs and renewals involving heavy expense) and of the traffic past and present, with a review of future possibilities. To place the railway in a position to continue giving an efficient public service, with a schedule capable of competing with road transport in the form of a fast daily train in each direction and suitable goods timings, it would be necessary to acquire new engines and rolling stock, replace certain bridges and relay 10 miles of track with 45-lb. rails and proper ballasting. Shop machinery, telegraph and other equipment would also be required, and the cost of rehabilitating the line is estimated at £41,000.

The question therefore arose whether this expenditure, which would be by no means final, would be justified. The report goes on to say that Barbados cannot afford two competitive systems of transport. The roads have steadily encroached upon the railway and have taken from it both passengers and goods, until practically all the produce and people are dependent on motor transport and nothing is left for the railway. So much is this so that net earnings for the last nine months of 1936 had fallen to only £400, although in the year 1927-28 gross earnings were nearly £15,000. Meanwhile Barbados is steadily building up its road system, and distances favour the motor. For example, St. Andrews to Bridgetown by rail is 24 miles and by road only 13 miles. Another factor militating against the railway is that the main crop of native produce, sugar, is a seasonal one. Finally, Mr. Bland says he is reluctantly forced to the conclusion that the railway has served its purpose and its abandonment is the wisest course. The report was duly presented to the House of Assembly, and the decision of the Governor, Council and Assembly of the island is conveyed in an Act published in the *Official Gazette* of October 18, 1937, authorising the Governor-in-Executive-Committee to sell or otherwise dispose of the property of the railway, the Act to come into operation on October 1, 1937.

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### U.S.A. Railways in 1937

DURING the first six months of 1937 railway managements in the U.S.A. experienced a continued increase in operating costs with traffic and revenue rising just enough to absorb this. There then followed a sharp decline in freight traffic, which together with added material costs and increased wages, resulted in the net earnings for the year as a whole being below the levels of 1936. For the whole year revenue carloadings averaged 5.6 per cent. above those of 1936 (an increase of 15.1 per cent. in the first quarter of the year turning to a decrease of 8.4 per cent. in the last). A graph showing the trend of revenue carloadings during the years 1935-36-37 appears on page 441. Passenger miles increased 10.8 per cent. Operating revenues were 3.3 per cent. higher, while operating expenses rose by 6.7 per cent. Net railway operating income was 590 million dollars—a decline of 11.6 per cent., while net income (after fixed charges) totalled 85 million dollars—a decrease of 48.5 per cent. The railways sold few issues of securities during the year—with the exception of equipment trust certificates, which were very well received. They had by the end of November, 1937, repaid 225 million of the 738 million dollars they borrowed from the R.F.C. and the P.W.A., and the government had sold 106 million of railway securities to private investors, leaving the net indebtedness of the railways at 407 million dollars. New borrowing from federal agencies during the year totalled 20 million, and repayments 16 million dollars. No important bankrupt roads achieved reorganisation during the year, while three additional lines—the Duluth, South Shore & Atlantic, the New York, Ontario & Western, and the New York, Susquehanna & Western—were placed in trusteeship. The mileage in bankruptcy at the close of the year was 72,009, a net increase of about 300 miles over 1936.

The railways now have about 12,000 fewer locomotives, 550,000 fewer freight cars, and 12,000 fewer passenger cars than seven years ago, and this decrease is far from being due solely to increased rolling stock efficiency, as although the locomotives have greater average tractive power and the freight wagons greater average carrying capacity, there have occurred sharp declines in the aggregate tractive power of the former and the aggregate

carrying capacity of the latter. Averages of the numbers of locomotives, freight wagons, and passenger coaches ordered annually during each of the last three seven-year periods were:—

	1917-23	1924-30	1931-37
Locomotives .. .. .	1,756	965	201
Freight wagons .. .. .	85,389	83,480	25,450
Passenger coaches .. .. .	1,150	1,875	239

The physical volume of railway purchases in 1937 exceeded that of the preceding year by a narrow margin, but the dollar value of material received and equipment ordered from manufacturers was materially higher—846 million dollars as against 749 million. Material costs rose by approximately 105 million dollars in 1937 over those of 1936. Fuel prices increased from 8 to 12 per cent., sleepers 13 per cent., rails 13 per cent., and new equipment 10 per cent. Signalling construction during the year as compared with 1936 made rapid progress. Constructional activities of the railways remained low—148 miles of new track and about 11 miles of multiple track being laid. Miles of line abandoned total 1,140. Level crossing elimination, fostered by public funds, has gone ahead. The amount of capital and maintenance expenditures of the railways—due largely to inadequate net earnings—has averaged 1,600,000,000 dollars a year less in the depression years than in the preceding period. The falling off, as our American contemporary, the *Railway Age*, from which we have quoted the foregoing statistics, points out, is the railways' "contribution to depression." It is hoped the railways will contribute to prosperity instead, if they are permitted net earnings which will make possible resumption of normal buying. At the beginning of 1938 the outlook for the railways of the U.S.A. for the immediate future seems to hinge almost entirely upon the rate increase case being currently presented to the Interstate Commerce Commission. The decisions of the commission when published will be an event of outstanding significance in the history of the railways of the United States.

\* \* \* \*

## Relay Interlocking

**A**LTHOUGH a certain amount of what is called relay interlocking—circuit interlocking, as some have proposed, might be a better name for it—had already been in use for some time in this country, and descriptions of installations had appeared in our columns and elsewhere, the subject had not been treated to any great extent in technical literature until Mr. A. J. Golding read his timely and instructive paper before the Institution of Railway Signal Engineers on December 8, 1937, a fact which made it, apart from other reasons, particularly welcome. Even at the time of the earliest attempts to apply power, and especially electric power, to the control and operation of points and signals, it was clearly realised by some that it would be possible to achieve the same security—and probably much more—as offered by the ordinary mechanical signalling equipment (developed to a fair degree of perfection in a relatively short time) by using combinations of electric circuits of some kind. The idea had some quite eminent advocates in early years, particularly C. E. Spagnoletti in England, and Edouard Brame in France, while it is not generally realised that great interest was awakened at the Paris Exhibition of 1881 by a number of electrical signalling devices shown by the Austrian railways, in which circuiting replaced mechanical locking mechanisms to a noticeable extent. About this time a very well-known French engineer, Cossmann, of the Nord, expressed the view that "one day the interior of those signal boxes, whence hundreds of appliances are manipulated, will be

equipped with a source of electricity and commutators, enabling us to send the current into a number of receivers, which will replace the old levers and be interlocked with one another, no longer mechanically but electrically, by switch combinations."

It is, of course, one thing to have a general and prophetic notion of something of this kind and quite another to bring it to concrete realisation, the latter involving numerous considerations touching engineering design. It is therefore not surprising that the early power signalling installations were little more than the existing mechanical ones with, as it were, power added to them, thus practically involving the disappearance only of muscular effort on the signalman's part, and perhaps somewhat extending the scope of the signal box. The mechanical interlocking of the operating handles—still called levers—remained, and the signalman continued to work them one by one, just as he had to do when the limitations of his physical strength made any other course impossible. It was, however, seen that the use of power would enable him to work directly in terms of train movements, and set the whole of a route governed by a given signal by a mere gesture or two, could suitable apparatus be devised. Although an Englishman proposed this in the 'eighties it was in France that the idea was brought to practical realisation in various forms, the individual merits, or otherwise, of which do not now concern us. In those, however, in which a route was identified and set by two handles, corresponding to its beginning and end, the greater part of the interlocking effects were obtained by circuiting, mechanical locking intervening only to a limited extent. As signal boxes of this type have given many years of satisfactory service, the practicability of what is now styled relay interlocking may be regarded as having been well established for some time. The use of such equipment necessitated a staff well trained in maintenance and the technique of rapidly locating a fault amid so many circuits. For these reasons some preferred to use mechanical means of producing the route setting action, so retaining the comparative simplicity of the individual lever systems and the effect of mechanical locking, without having to work out or construct any, as such. The simplicity of this idea is so great and so attractive that we are at a loss to understand why it has never found its way to this country, where the practice of making every movement by signal renders it easily applicable.

With the development of the conception of relay interlocking, in which the handles operated by the signalman serve merely to set mechanism remote therefrom in action, to which the function of securing the safe interaction of the components of the installation is transferred, came the proposal to make such handles quite small and mount them on a track plan instead of in the conventional type of frame, leaving them free to move at all times, since no dangerous irregularity could arise therefrom. This freedom of the handles is sometimes spoken of as if it were a virtue in itself worth some effort to obtain, but whether it will succeed in superseding interlocked handles must, we think, depend on operating rather than technical considerations. There are some who feel it a decided advantage for a signalman to be unable to move a handle while the normally resultant consequences are not permissible, apart from mere safety principles. So, too, the question of whether it is easier to reach about on a track diagram for the handles rather than have them grouped together in front, is one chiefly for operating men to decide, although in very large layouts constructional considerations must perhaps play some part in it. There are now no real technical obstacles to achieving anything desired in signalling, but cost remains an important deciding factor. On this no great amount of information has been made

public. We now have in service in Great Britain, however, some recent large installations of what we may call the older type, and others of the new in service or being built, so that within a few years enough experience should be available to furnish a true all-round comparison involving every relevant consideration, including cost of upkeep and renewal, and liability to failure.

\* \* \* \*

### Think of a Name

"**T**HINK of a number" has been the cry of the unfortunate parlour magician for many years, as a preliminary to leading his victim through a maze of designedly bewildering calculations that at length bring him back to the point whence he started, and enable his thoughts to be "read." It sometimes strikes us that those who debate the appropriateness of locomotive names indulge in a not dissimilar form of spellbinding, by starting side issues in which, once involved, the disputants stray from the tranquil path of purely academic criticism. For example, when the correspondent whose letter we publish below describes the principle of naming the L.M.S.R. "Jubilee" class locomotives after British overseas possessions as "blatantly imperialistic," there will be many who will ignore the justice of his other observations to press him to be more explicit on this point alone. If the "Jubilees" are "blatantly imperialistic," why not call the "Castles" of the G.W.R. "flagrantly feudal," or the "Kings" of the same company "demonstrably dynastic." Soon the discussion is likely to branch off into fields whither THE RAILWAY GAZETTE, having no partisan politics, is not qualified to follow it. Admittedly, some of the "Jubilee" names strike a quaint note, but is our correspondent a reliable critic of euphony seeing that a little further on he declares a preference for the faintly ridiculous "Baby Scot" rather than the noble-sounding "Patriot" as a class name for another L.M.S.R. 4-6-0 series? The "Patriot" class engines have been brought into the public eye by reason of the ceremonial with which their names are often bestowed upon them; and to the public, indifferent to their derivation, "Baby Scot" conveys no more stately image than that of a small, yelling MacSomebody.

If we must state our own taste in locomotive names, let us say that we like something tough but distinguished.

The "King Arthurs" of the Southern Railway have always struck us as extremely satisfactory in this respect. We do not profess to know the legend attached to every nameplate, but we can presume that even the black sheep among the knights came of good family. Similarly, regimental names for engines do not arouse in us the displeasure felt by our correspondent, Mr. Tuplin. We secretly hope that the regiments in question will prove very tough indeed in time of crisis, while their distinction is guaranteed as far as we are concerned by the history of the British Army to date. Abstract names for engines can be submitted to the same test. Who would bestow a second glance on a *Prudence*, or a *Thrift*, however much the possession of these virtues distinguishes a man among his fellows. Yet *Valour*, with its implication of a strong right arm, commands instant attention and reverence. It has just occurred to us, by the way, that names of politicians have never been popular for locomotives, though whether through a want of toughness and distinction we do not now propose to enquire.

Another correspondent of ours, Mr. A. B. Longbottom, writes to remark upon the personality inherent in such early locomotive names as *Catch Me Who Can*, and *Puffing Billy*; he traces the decline of similar titles to the desire of celebrated men to have their own names preserved for posterity on locomotives, thus subjugating the personality of the engine to their own. It strikes us, however, that as engines were produced in quantity, so their individual personalities declined, until even if invention could have found something as spirited as *Wylam Dilly*, *Quicksteed*, and so on for the whole of a lengthy class, the names themselves would have lost their force when applied to locomotives inherently similar. Today, it is the casual observer whose interest is quickened by a name, probably without paying much attention to the engine that bears it (as a motorist, he takes mechanism for granted); whereas the locomotive enthusiast, amateur or professional, is more likely to identify a locomotive by its number. As Mr. Longbottom remarks, the practice of naming engines is now experiencing a revival, and we consider that considerable ingenuity is shown in establishing contact with public interests (as in the "football" engines of the L.N.E.R., and those of the L.M.S.R. named after celebrated resorts). Yet at least one engine with a very distinctive personality we are today satisfied to think of by number alone—we refer to No. 10000 of the L.N.E.R.

## LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

### Naming of Locomotives

390, Wakefield Road, Huddersfield,  
January 30

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—Recent publication of the excellent booklet on "Modern Locomotives of the L.M.S." draws attention once again to the unhappy methods lately adopted by that company in naming locomotives. The precise object of naming a locomotive at all is, perhaps, a matter for doubt, but if it is done, surely the name should be one which tends to confer some degree of dignity. The G.W.R. method is admirable in this respect, such type-names as "Court," "Castle," "Hall," "Manor," and "Grange" giving an impression of stateliness and even grandeur, whatever particular names are associated with them (although *Dryslwyn* does slip uneasily from non-Celtic tongues). Even so, some care has evidently been used in selecting particular names, for *Oystermouth*, which would have strained even the dignifying powers of

*Castle*, although once proposed, is not actually in use. It is lack of such discrimination that has led to unfortunate results in L.M.S.R. locomotive names.

Engines of the Stanier "5XP" class are named after British territories, every single one having been religiously raked in, regardless of euphony. Apart from the blatantly imperialistic nature of such a course, it is objectionable because it gives the impression that it was not thought worth while to go to any trouble beyond that of merely copying out a list. It is difficult to admire such a name as *Sarawak*, and a glimpse of *Tobago* in dim light makes one wonder whether a misprint has occurred. The same general comment may be made in connection with the series of admirals. *Nelson* is adequate, because the name is so widely known (at least in this country) that no other qualification is necessary, but such gaunt simplicity is unsatisfactory in other cases. The late Mr. Charles Rous-Marten, writing in *The Railway Magazine*, used to refer occasionally to an L.N.W.R. locomotive bearing the name *S. R. Graves*, which he would meticulously



abbreviate to *Graves* in order to provide a target for a somewhat elephantine humour. Had he been with us still, what jingles he would have extracted from *Keyes*, how he would have laboured over *Shovell*, how painfully he would have applied himself to *Madden*! These names could easily have been improved; even the second one becomes tolerable when preceded by *Sir Cloudsley*.

When we turn to the "Royal Scots" we find tragedy indeed. It is unfortunate that we, as a nation, are compelled by the shortcomings of our neighbours to maintain large quantities of armed forces, but it seems unnecessary and tactless to emphasise the fact by naming harmless locomotives after Guardsmen, Riflemen and other varieties of death-distributors. Lack of nobler inspiration can hardly be pleaded in extenuation, for in their early days the 6125-6149 series bore names commemorating the happier naming of some of the first locomotives. Such substitutions as *The Prince of Wales' Volunteers (South Lancs.)* for *Vesta*, and *The York and Lancaster Regiment* for *Lion*, leave one with feelings too deep for printed words. One may suggest that, if military honour must be satisfied, there might have been extension of the procedure followed with No. 6121, whose nameplate bears the cryptic reference *H.L.I.* ("which please quote in all correspondence").

Even in type-names, the L.M.S.R. has been unfortunate. As the Stanier "5XP's" were first given a type-name in 1935, the selection of "Jubilee" can be understood, but the association of the name with an ill-starred class of Webb compound can hardly endear it to old North-Western men. Again, the announcement that the Fowler "5XP's" are to be known officially as "Patriots" is not likely to have any appreciable effect in unofficial circles. The locomotives have been known for some six years as "Baby Scots," and it is difficult to imagine that any other name will ever be applied to them in ordinary conversation. Allocation of the name *Blackpool* to one of these engines is a reminder that over ten years ago the G.W.R. deliberately removed all British place names from its locomotives lest passengers should be misled by regarding them as destination indicators.

Yours faithfully,

W. A. TUPLIN

[We comment editorially on Mr. Tuplin's letter on page 403.—Ed. R.G.]

### The G.W.R. London—Birmingham Service

Birmingham, February 28

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—As a regular traveller and one who has had extensive experience of the G.W.R., I have studied the article on the G.W.R. London—Birmingham service in your issue of February 11 with the greatest interest. I cannot help feeling, however, that the difficulties of maintaining a 1½-hr. booking are rather exaggerated. Taking the uphill speeds anticipated to be necessary in the down direction, there is first of all shown a sustained 62-63 m.p.h. up the 1 in 254 gradient from Gerrards Cross to Beaconsfield. To a "King" class locomotive such a time as 14½ minutes from Northolt Junction to High Wycombe should be perfectly easy. In 1928 I observed the 2-cylinder "Saint" class 4-6-0 No. 2906 *Lady of Lynn* to cover this distance in 14 min. 55 sec. with a load of 295 tons tare and 320 tons gross; 64½ m.p.h. was steadily maintained up the 1 in 254 beyond Gerrards Cross and the engine was so little exerted in the process that the exhaust was inaudible from the second coach in the train.

The ascent of Saunderton bank is probably the stiffest of all, in the anticipated speeds, with the rate gradually rising to 55 m.p.h. up a 1 in 164 gradient. It is not generally the rule for G.W.R. engines to be unduly exerted here, and for true possibilities some recent performances of the L.N.E.R. "Sandringham" class 4-6-0's provide the most illuminating guide. Working on no more than 25 per cent. cut-off, one of this class (having a tractive effort of 25,380 lb. against the 40,300 lb. of the G.W.R. "Kings") smartly accelerated a train of 310 tare tons from the Wycombe slack to 50 m.p.h. by Saunderton summit. So 55 m.p.h. at the same point should not distress a "King."

The 1 in 200 gradient of the Bicester bank, up which 65

m.p.h. is scheduled, naturally invites comparison with other well-known stretches at the same inclination. On the Northern Railway of France sustained minimum speeds of over 60 m.p.h. up the ascent to Survilliers are everyday feats with 500-ton trains, by the Collin Super-Pacifics, which have a tractive effort somewhat less than that of the G.W.R. "Kings." There are other well-known 1 in 200 banks, where 300 ton trains are regularly hauled at sustained minimum speeds of 70 and even 75 m.p.h., again by locomotives having less tractive power than the "Kings."

The scheduled speed over the Banbury—Leamington stretch is a mere "jog-trot," and is presumably designed as a recovery margin, in readiness for the heavy ascent of Hatton bank. Now here, in the recovery from Leamington slack, I think an increase from 40 m.p.h. to no more than 60 beyond Warwick is a very modest anticipation of "King" performance. I have a record of No. 6017, on a by no means exceptional run, attaining 55 m.p.h. here, in two miles from a dead start at Leamington, and clearing the Hatton bank at a minimum speed of 49 m.p.h. This was with 308 tons tare and 330 tons gross. When passing Leamington at 40 m.p.h. I think it would be more reasonable to expect an acceleration to nearly 70 m.p.h. beyond Warwick rather than the modest 60 m.p.h. expected; from the former speed Hatton bank could easily be "rushed."

On every bank of any severity I do not consider that on any grounds the uphill speeds required by the proposed 1½-hour schedule can be called "exacting." On the basis of past and present performance they should be satisfactorily achieved not only by the "Kings" but also by the "Castle" class engines. In support of the latter class, I conclude with skeleton times of a run by No. 4088, hauling a load of 440 tons tare, and 475 tons gross, which was not reduced at any point by the detaching of slip portions.

Miles.		Present 2 hr. schedule	Min. sec.
0-0	Paddington ... ..	0	0 00
3-3	Old Oak Common West ... ..	7	7 20
10-3	Northolt Jc. ... ..	15	15 35
26-6	High Wycombe ... ..	31½	32 15
34-7	Princes Risborough... ..	42	42 30
44-1	Ashendon Jc. ... ..	49½	49 40
62-4	Aynho Jc. ... ..	67	67 15
67-4	Banbury ... ..	72	71 55
87-3	Leamington ... ..	91	89 50

Yours faithfully,

"BRUMMAGE"

### Funnels v. Chimneys

London, February 23

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—I have read with considerable interest your recent editorial references to the use of the words funnel and chimney. This subject was referred to some months ago in the columns of *The Railway Observer*, the journal of the Railway Correspondence & Travel Society, and the following were among the points of interest which then came to light. Mr. W. Beckerlegge stated that on page 29 of the *Minutes of Proceedings of Civil Engineers* for March, 1885, in a paper read on the "Gladstone" class of the L.B.S.C.R., W. Stroudley mentioned experiments to show the degree of vacuum in firebox, smokebox, and funnel, and again on page 76 "By passing the vacuum gauge pipe up the funnel, 12 to 14 inches of vacuum could be obtained." Mr. Beckerlegge added that J. Ramsbottom, describing to the Institution of Mechanical Engineers his celebrated duplex safety-valve, stated that it could be covered by an ornamental brass funnel if so desired. Evidently an older school of locomotive engineer frequently used the word.

Another correspondent to the same columns, Mr. F. J. Tabor, wrote that he was inclined to agree with a previous statement regarding the customary use of chimney, but pointed out that a G.W.R. working timetable contained a note that on certain sections a large tank engine must not be coupled to a "King" class engine funnel to funnel!

Yours faithfully,

M.I. LOCO.E.

## PUBLICATIONS RECEIVED

**The Principles and Practice of Surveying: Volume I. Elementary Surveying.** By Charles Breed and George L. Hosmer. New York: John Wiley & Sons Inc.; London: Chapman & Hall Limited, 11, Henrietta Street, Covent Garden. 7½ in. × 4½ in. × 1 in. 717 pp. Illustrated. Folding plates. 20s. net.—The popularity of this book is indicated by the fact that since its first publication in 1906 it has run through six editions, the present volume being the seventh. The authors' chief purpose was to produce a text book which should include the essentials of a comprehensive knowledge of practical surveying and at the same time be adapted to the use of teachers and students in technical schools. Originally intended as an elementary treatise, chapters have been added in subsequent editions covering all the later developments in the subject which are now common practice. The book is divided into four parts: Part I deals with the use, adjustment, and care of instruments; Part II, surveying methods; Part III, computations; and Part IV, plotting. Finally, there is a section devoted to tables and formulae, and three appendices dealing respectively with the planimeter, proof of the arch-chord formula, and party-wall agreements. A comprehensive cross-reference system giving the page as well as the article number has been adopted. This, together with the complete index at the end of the book and many practical hints throughout render it useful to the practical surveyor as a reference book. The volume is bound in limp covers and slips readily into the pocket.

**Clay Cross Company Centenary.**—The close association between early railway enterprise and the coal mining industry is sufficiently well-known to need no emphasis, but few companies have been more intimately connected with prominent railway personalities than the Clay Cross Co. Ltd., which recently celebrated its centenary. In this case the mining enterprise resulted from railway construction instead of the reverse, for it was while surveying the North Midland Railway in the autumn of 1835, that George Stephenson first became actively interested in this part of the world, and it was tunnel construction at Clay Cross for the North Midland Railway which revealed to him the vast mineral wealth of the district. The Clay Cross enterprise was established in 1837 under the title of George Stephenson & Co., and the great railway pioneer himself assumed the chairmanship. The company still retains in its possession minutes signed by Stephenson, and one dated November 4, 1846, includes also among those present Robert Stephenson, George Hudson, Joseph Sandars, Sir J. Walmsley, and William Claxton. Robert Stephenson occupied the chair from 1848 to 1851, and was succeeded in this office from 1851 to 1862 by the great

railway contractor, Sir Samuel Morton Peto. Other famous names concerned with the Clay Cross enterprise are Sir William Jackson, Robert Hudson, George Carr Glyn, afterwards Lord Wolverton, Sir Joshua Walmsley, Thomas Hughes Jackson, Sir H. M. Mather-Jackson, and Brig-Gen. G. M. Jackson (the present Chairman of the company).

In the first year of its existence the company sank the Clay Cross (No. 1) coal pit, and such was the progress made that in the following year (1838) coal was actually being wound from this colliery. An event of considerable historic interest took place in 1840 when the company sent coal to London, partly by rail and partly by canal. In 1844, the company also had the distinction of being the first to send coal direct to London by rail. To mark the centenary, the Clay Cross Co. Ltd. has recently published a handsome brochure in stiff linen board covers entitled "Clay Cross Company Centenary: A Hundred Years of Enterprise: 1837-1937." In this is outlined the history and modern development of the undertaking, and the pages are enlivened by a large number of coloured illustrations of considerable historic interest as well as by portraits of the chairmen, directors, and other chief officers of the company, past and present, who, as we have already indicated, constitute a remarkable collection of railway personalities. Within recent years the company has strengthened its close link with railways by opening on Monday, April 6, 1925, a light railway from Clay Cross works to Ashover. The opening ceremony was performed by the late Mr. Thomas Hughes Jackson, the venerable Chairman of the company, who was then in his ninety-second year.

**Railway Insulation.**—A brochure entitled "Railroad Insulation," just to hand from J. W. Roberts Limited, of Midland Works, Armley, Leeds, a firm prominently identified in the minds of railway mechanical engineers and builders of locomotives and rolling stock, with the manufacture of insulating materials for use thereon, conforms to the highest standards of publicity literature. Measuring 11½ in. by 9½ in., and containing approximately 50 pages, it has a most attractive cover, and is printed on a high-class tinted paper throughout. The illustrations are numerous, beginning with a reproduction, in indigo tint, of a section of crude asbestos, and followed by a wide selection of illustrations of locomotives and trains, locomotive boilers (the lagging process on the latter being shown in various stages of completion), railway passenger coaches and freight vehicles, motor omnibuses, and a series of tank wagons in course of being insulated. These illustrations are reproduced in a pleasing shade of sepia, and views are given of sections of Nonpareil cork flooring, Decolite composition flooring,

train heating pipe insulation, Limpet asbestos fibre rope, and a separate view of Limpet asbestos blanket. Various colours are used for these latter illustrations, thus adding to their distinctiveness and realism. The same treatment is accorded to the Limpet flexible decoration, a product designed to meet standard modern requirements for bright and cheerful interior decoration for rail and road vehicles.

In the locomotive section there are some interesting data and illustrations covering a sprayed Limpet asbestos which is applied by a patented process particularly suitable for heat and sound insulation in steel rolling stock, also for the treatment of locomotive boilers and cylinders. A striking full-page picture of the Coronation train of the L.N.E.R., on which Limpet heat and sound insulating specialities are used throughout, is included among the illustrations. It would, we think, be difficult to improve upon the general style of reproduction or the clear printing of so much practical information in the space at disposal. Even apart from its main purpose, a publication such as this, with its collection of reproduced photographs of locomotives and rolling stock, is of interest, and the general effect is to establish clearly the fact that the firm responsible for it is in a specially favourable position to supply insulating materials to meet the varied needs of railways in this field, whatever form they may take.

**A New Capstan Lathe.**—From Drummond Brothers, of Ryde's Hill, Guildford, we have received a copy of a catalogue in which the new "K" type capstan lathe of that firm's manufacture is illustrated and described. This machine has been designed to meet the most exacting demands of up-to-date plants. It is powerfully built throughout, and has very substantial ball and roller bearings to the main spindle, and at all points where heavy duty demands them. The machine is manufactured on the same plan as the well-known Maxicut multi-tool lathes of the same firm, and the same rigid standard of production and inspection is maintained throughout. Points of particular interest in this generally robust and well-designed lathe are: pre-loaded ball bearing and roller bearing headstock; simplified speed and feed changes; covered and fully-protected saddle stops, and enclosed and fully protected capstan stops at rear of slide. The two last-named features are exclusive to this lathe. The body is rigidly constructed and mounted on a large single casting pan and base. Covered ways are provided to the bed, and automatic sliding and surfacing feeds are included. The catalogue is well produced, and a double-page illustration of the complete lathe is given in the centre opening, with an inset giving a rear view of the machine with the splash guards removed. Drawings showing a floor plan of the machine, tools for bar and chuck work, and a capacity chart, appear at the end of the catalogue.

## THE SCRAP HEAP

For the next two months, Underground passengers, waiting at Leicester Square Tube station, will be able to while away the time by looking at a show case filled with exhibits from the Victoria and Albert Museum. This large circular glass case, which stands in the middle of the booking hall, was taken over by the Museum authorities on February 18, and Mr. Leigh Ashton, a member of the museum staff, went to the station to arrange the exhibits in the case. Porcelain and small pieces of furniture from Europe and Asia and costumes and wearing apparel of the Victorian period will be displayed. "The object of the display," said Mr. Ashton, "is to advertise the Victoria and Albert Museum, and to remind people that it is open till fairly late on three nights a week and that it is a good place to go to if they can't get into a cinema."

### A PULLMAN PIONEER

Mr. Joseph Monck, who died in December, 1910, was for many years mechanical superintendent in England of the American Pullman Car Company. In 1874 he erected at the Midland Railway Works at Derby the first car to run in this country, and on the Midland Railway Company purchasing the Pullman cars in March, 1889, Mr. Monck left Derby to superintend the cars on the Brighton and the South Eastern systems. He then joined the staff of the Wagon Lits Company, and afterwards became London Agent for W. S. Laycock Limited of Sheffield.

### A VITAL INTEREST

There are fully 30 million citizens with a financial interest in the railroad industry of the United States of America. Of the eleven billion dollars of railroad bonds outstanding, almost one-half are owned by savings banks and insurance companies. This means that millions of savings bank depositors and holders of insurance policies, whether they all know it or not, have a vital interest in the integrity of these securities. Almost two billion dollars additional of railroad bonds form part of the endowment of churches, hospitals, and educational or charitable institutions.—*Mr. Thomas W. Lamont in "Railroad Data."*

Following the announcement of the death on February 18 of Canon H. Wesley Dennis, well known in connection with his educational work, a correspondent to *The Times* wrote as follows:—"Somewhere about 1893 Mr. Wesley Dennis was on his way home when, in the evening paper, he saw a paragraph stating that the site of the girls' school at St. John's Wood (now St. Margaret's, Bushey) was required by the Manchester & Sheffield Railway, which had agreed to pay the sum of £20,000 to the Charity Commissioners

for it. He was much astonished by this announcement, as he should have known, as representing the governors of the school, of any such agreement. In the interests of the school he set to work diligently and at once to secure fairer treatment. As a result of great labours on his part evidence was produced to show that the school was not built out of trust moneys. When the case came to trial the Charity Commissioners were put out of it and the governors were awarded double the amount previously offered in compensation for the loss of their property. This enabled the present St. Margaret's School to be built in 1895 by Waterhouse. The close association of Canon Wesley Dennis with the school continued till his death, a period of 48 years."

### AN EARLY HEADWAY CLOCK

Before the introduction of the block system, and for a long time after on some sections of line, the time interval system of signalling was used, under which a "danger" signal was shown at a station for a certain interval after a train had passed, with the object of allowing it to get a safe distance ahead (or of the guard protecting it if it could not) before another train was allowed to follow. The "danger" signal was very generally followed by a "caution" signal for a further prescribed interval, after which an "all clear" indication was given. Both hand signals and fixed signals, of various kinds, were employed for the purpose, and dependence was placed on correct observation of a clock by those entrusted with their use. This led various inventors to design automatic signals controlled by some timing mechanism, one of the best known being those of Baronowski, said to have been tried near Hackney on the North London Railway.

Some of these inventions used the ordinary semaphore or disc signals, but others employed indicators intended to show how many minutes had elapsed since the passage of the previous train, and were in fact headway clocks. The accompanying illustration shows one of these devices due to John King, a lace manufacturer of Heanor, Derbyshire, Patent No. 3316 of 1862. The pillar contained a clockwork mechanism, and a mechanical treadle arm was arranged alongside the rail which, when touched by the wheels of a passing train, caused the pointer on the dial to fly to the zero position, from which it gradually advanced under the action of the clockwork until it reached the 15 minutes position, where it was disengaged therefrom and locked, returning to zero when the next train went by.

A lamp was arranged to throw light over the dial, and to the left of the latter was an opening behind which coloured glasses were moved in consonance with the pointer, giving night



*Early headway clock, an 1862 device of John King, of Heanor, Derbyshire*

colour aspects, probably red, green and white, to show the condition of the apparatus at a greater distance than the pointer could then be discerned. Spon's "Dictionary of Engineering," 1874 edition, says that this appliance was tried at Kegworth station on the Midland Railway, but was removed, its working not being very satisfactory.

The ordinary semaphore signal can be seen at the end of the platform in the picture, with its arm—or arms—lowered down inside the post, a very general practice for the "all clear" aspect in early days. Whether this is Kegworth station, however, does not appear. King's apparatus did not differ in working principles from the headway clocks seen on the London Underground today, but the gradual extension of the block system caused interest in such devices to diminish, and it is only in more recent times that they have been found valuable as a traffic regulating medium, in conjunction with modern signal equipment.

### THE NEW ENGINE WHISTLE, LONDON AND NORTH EASTERN RAILWAY

If I to self-destruction were inclined,  
I fain would lie,  
And wait thy coming in the four-foot way,  
Complacent victim of a syren's sway,  
To death resigned.  
Soothed by the sweet contralto of thy voice,  
T'were bliss to die,  
And, wrapped in thy mellifluous mass,  
In pieces pass.

[A. QUITZOW]



# OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

## RHODESIA

### Record Railway Earnings

The total earnings for 1937 were the highest in the history of the Rhodesia Railways. The revenue and expenditure figures, compared with the previous year, are as follow:—

	Years ended September 30,		Increase
	1937	1936	
	£	£	£
Total earnings ...	5,730,677	4,450,426	1,280,251
Total operating expenditure ...	3,050,453	2,779,687	270,766
Net operating revenue ...	2,680,224	1,670,739	1,009,485

Despite the heavy traffic handled and the record revenue, the operating expenditure was some £490,000 below the previous largest figure of £3,541,587 incurred during 1930. The operating revenue for 1937 exceeded by over £361,000 the previous record total earned.

In his New Year message to the staff the General Manager, Sir Henry Chapman, C.B.E., writes:—

We have passed from severe financial stringency to record earnings, and in particular during the past year have been called upon to deal with an unprecedented volume of traffic. That our organisation has endured the severe strain placed upon it is a tribute to every employee, and I am grateful for the loyal support given to the administration and to me as its operational head. I recognise clearly that the traffic could not have been handled had it not been for the untiring efforts of all grades of staff, who, I feel, are actuated by the team spirit fostered by the lessons of the past and hopes of the future.

During the year a tonnage of 3,005,741 was carried and 5,496,902 train-miles were run, increases of 693,091 tons and 1,359,825 train-miles over the previous year. Coal and coke traffic rose by 268,551 tons to 905,024 tons; chrome ore by 100,582 tons to 280,127 tons; export copper by 94,133 tons to 288,325 tons, while maize for export and general goods showed large increases.

### Permanent Way and Bridge Programmes

Rapid progress is being made with the 80-lb. relaying programme on the main line of the Rhodesia Railways. The first year's work from Salisbury to Hunters Road, 163 miles, was finished last July, and the 134-mile section between Hunters Road and Bulawayo is expected to be completed in March this year. Ballasting will shortly be begun on the Sawmills-Thomson junction section, and depots for the relaying gangs are being established at Sawmills and Dett. This third section will involve relaying 156 miles, with 80-lb. rail, for which 23,500 tons of material have been ordered in England.

On two other sections of the main

line relaying with 60-lb. rail is being carried out; some 82 miles between Umtali and Salisbury, should be completed by the end of May, and on the section between Beira and Vila Machado, 27 miles out of 44 have already been relaid.

The work of strengthening bridges on the West Nicholson branch to carry the heaviest locomotives and rolling stock is practically complete, and the bridge gangs are now to be transferred to carry out similar work on the Fort Victoria, Selukwe, and Shamva branches.

### Improvements at Bulawayo Workshops

Attention has been given to the need for the quick release of locomotives and vehicles sent to the works for repair, so that they may be speedily returned to traffic during the present heavy pressure upon the rolling stock. Improved facilities are now being provided at the Bulawayo works, which include the following:—

An electrically driven Craven 48-in. wheel lathe, with a motor-driven Churchill 20-in. wet emery stone; a motor-driven Bellis and Morcom air compressor to replace the old smaller steam plant; a 30-in. by 36-in. Mumford type pneumatic swing head press moulding machine with jolt ram arrangement for the manufacture of brake blocks; equipment for the greater use of electric welding instead of riveting; and the enlargement of the wagon machine shop and extension of the electric power line to this shop.

## ITALY

### New State Railways Passenger Coaches

The latest Italian State Railways main-line coaches have a length of 21·87 m. (71 ft. 9 in.) or 0·65 m. (2 ft. 1½ in.) longer than the preceding ones. To enable them to keep within the clearance limits on curves they are 3 cm. (1½ in.) narrower, this amount having been taken off the compartments, leaving the corridors as before. The general arrangement of the end vestibules, lavatory and body framing, has not been altered. They are of all-steel construction designed so that the sides and floor together share in the stresses. The total weight of a first, second, and third class coach seating respectively 12, 18, and 32 passengers is 41½ tons. By the use of high-tensile steel and such aluminium alloys for unstressed parts as Anticorodal, Silumin, and Duralite, a saving in weight of about 1½ tons has been made. The coaches are mounted on roller bearings. Internally the design is simple but attractive, and in conformity with the national self-sufficiency policy of Italy, as much home-produced material as possible has been used. For example, cotton and wool are excluded from the

upholstery, artificial silk and hemp having been used instead, while the seats instead of being of sponge rubber as in the previous vehicles have springs and horsehair stuffing. The third class compartments also are upholstered and in all the compartments the windows let right down.

## NORTHERN IRELAND

### Road and Rail Transport Act Inquiry

As recorded in THE RAILWAY GAZETTE of February 18, the Government of Northern Ireland is setting up a commission to investigate the operation of the Road and Railway Transport Act. Under the Act the receipts of road and rail transport were pooled and the railway companies expected to receive a contribution from the Transport Board in respect of traffic which had been diverted from the railways by buses and road freight undertakings. Instead of receiving anything from the pool the railway companies, according to the board's first accounts, reviewed in THE RAILWAY GAZETTE of February 18, contributed £5,850. It was stated after publication of the report that a conference was to take place between the Government and representatives of the railway companies in regard to the working of the Act. The transport scheme has been the subject of bitter controversy. Three of the main grounds of criticism have been:—

(1) The public complaints of a serious reduction in transport facilities and of increases in the tariffs for goods and rates for passengers;

(2) Owners of transport undertakings compulsorily acquired by the board complained that there were serious delays in determining their compensation and in hearing appeals;

(3) Recipients of compensation complained that the sums awarded to them in excess of £5,000 were paid in the board's "B" stock, which rapidly depreciated to about 65 per cent. of its nominal value, and at that price is now practically unsaleable.

The Chairman of the board (Mr. D. L. Clarke), discussing the report at the time it was issued, pointed out that in only thirteen cases was stock issued in consideration for the taking over of undertakings in the first year.

He referred to the evasion of the provisions of the Act in regard to restrictions as to the transport of passengers or merchandise by road, and declared that the future results of the undertaking with regard to the transport of goods must, to a large extent, depend on whether the board succeeded in obtaining a sufficient proportion of the traffic carried by former operators. Dealing with freight, it was emphasised in the report that in certain areas a number of merchants who had hitherto employed public carriers whose businesses were being acquired, purchased lorries to carry their own traffic. The board was thus deprived of the opportunity of carrying a considerable volume of traffic which formed part of the former undertakings, and in respect of which consideration had been paid by the board. Moreover, a number of people, including some whose undertakings were

acquired by the board, had under different subterfuges carried on business. It was estimated that the approximate loss of revenue from these causes for the four months ended September 30, 1936, was about £9,000.

#### Railway Deputation on Pooling

The directors of the railways operating in Northern Ireland recently sent a deputation to the Minister of Home Affairs in regard to the pooling arrangement of the receipts between the railways and the Road Transport Board. Owing to the loss incurred by the board during the first two years' operation, amounting to nearly £200,000, the railways had to pay substantial sums to the board under the pooling scheme. An Act was passed in the Northern Parliament to enable the Transport Board to pay interest on the transport stock for five years, during the re-organising period, out of capital.

The Ulster Farmers' Union, on the other hand, has been demanding the withdrawal of agricultural produce and requirements from the control of the road transport monopoly, and this was one of the issues raised in the recent general election in Northern Ireland, and was included in a questionnaire sent to all candidates by the Ulster Farmers' Union.

## FRANCE

#### Railway Traffic Receipts

Since the National Railways Company took over the railway systems on January 1, the traffic receipts have been tabulated for the entire country and are no longer shown separately for the pre-existing companies and State lines. The receipts are classified under four headings: passengers (including dogs), luggage, parcels, and goods. The railway income shows a substantial increase in comparison with the same period last year. This is due wholly to the rises in fares and freight rates, which were increased on July 20, 1937, and again on January 1, 1938. The length of lines operated on January 1 was 42,558 km. (26,445 miles) against 42,523 km. (26,423 miles) on January 1, 1937.

The returns are issued weekly. For the first four weeks this year to January 28, the total receipts in comparison with the same weeks a year ago show an increase of 30.54 per cent. per kilometre. The figures are as follow in thousands of francs:—

	1938	1937	Increase
Passengers ...	200,728	169,919	30,809
Luggage ...	3,984	3,564	420
Parcels ...	48,887	34,236	14,651
Goods ...	723,605	540,248	183,357
Total ...	977,204	747,967	229,237

#### Reduction of Expenditure

M. Guinand, President of the National Railways Company, stated in a recent interview that the management must reduce the expenditure to a minimum. Under the company's statutes, the railway tariffs must be

increased if there is a deficit, or the national budget would be called upon to make good the loss. He added that the unification of the services and the centralisation of the management would tend to lower the expenditure. The National Company would have the advantage of buying in large quantities. It would also be able to reduce cost prices by unifying material and standardising the rolling stock.

Rail and road co-ordination would also effect economies. Out of 6,000 km. (3,728 miles) of lines to be suppressed this year, 1,000 km. (621 miles) were already being dealt with. M. Guinand said that despite the two increases in tariffs, French railway charges compared favourably with those of other countries. They were on the same level as the Belgian charges, which were noted as very moderate. The National Company had under consideration the reduction of fares for holiday travel. They were also hoping to avoid too great a rush of holiday traffic by distributing holidays with pay over a longer period in agreement with trade unions and employers' associations.

#### Cheaper Fares for Tourists

Proposals to reduce railway fares of foreign tourists in France this year by 50 per cent., to cut the price of petrol, and to grant other advantages to tourists as during the Exhibition period last year are now being made. If adopted, they will be embodied in a short Bill, which it is expected will be voted immediately by Parliament so that the necessary announcements can be made abroad.

## SWITZERLAND

#### Prevention of Accidents on the Federal Railways

Gratifying results have been attained on the Federal Railways owing to the continued efforts of the department organised in 1928 for the prevention of accidents to the staff. The relative frequency of occupational accidents per 100 employees had decreased in 1937 by 35 per cent. as compared with 1928, in spite of reductions in staff numbers and increase in traffic. Fatal accidents decreased by 48 per cent. The most striking improvements were effected in the railway works (Olten, Bellinzona, and Yverdon), where the frequency of accidents per 100,000 working hours dropped from 21.1 per cent. in 1928 to 5.3 per cent. in 1937 (representing a decrease of 75 per cent.). Accidents to the eyes of men employed in the works have, in particular, been reduced to a remarkable degree, and in 1937 there was only one such case per 100,000 working hours; this is 83.4 per cent. less than the average for the years 1929-32. An effective means used by the department concerned is the frequent publication in the Federal Railways staff bulletin of articles (illustrated by diagrams and photographs) describing typical accidents and explaining their

cause and how they could have been prevented.

#### 1937 Results

The following figures for some of the principal tourist lines show that the railway improvement was general:—

	Receipts in Fr.	
	1937	1936
Rhaetian ...	10,287,375	9,145,323
Chur Arosa ...	1,084,850	883,034
Furka-Oberalp ...	493,141	469,932
Visp-Zermatt ...	873,993	703,694
Bernese Oberland ...	1,102,800	788,911
Lauterbrunnen-Mürren ...	58,333	41,270
Montreux-Oberland ...	1,481,500	1,299,184

#### Federal Railways Reorganisation Bill

The draft Bill for the new Federal Railway Law, the scope of which was referred to editorially in THE RAILWAY GAZETTE for January 22, 1937, is before the National Council, which met on February 7 for an extraordinary session. The Bill was thoroughly examined in the course of last year by a special parliamentary commission, whose reports form the basis for the present discussions.

## INDIA

#### Public Suggestions and Complaints

At all important stations on the South Indian Railway, books are maintained, in which any passenger may enter suggestions or complaints; these will receive due consideration from the administration.

#### Railway Preparations for Congress

IN THE RAILWAY GAZETTE of February 18, mention was made of the large scale preparations by the B.B. & C.I.R. for the forthcoming meeting of the Indian National Congress at Haripura, a small village in the Bombay Presidency. The site has been named Vithal-Nagar, and the main railway arrangements for the session are centred round Madhi, a small wayside station on the Tapti Valley Railway. To avoid congestion at Madhi, five new stations have been built between Surat and Vyara. At Udhna junction, three miles from Surat, high level platforms have been built and special sidings laid to cope with the increased traffic. Madhi station itself has undergone complete transformation. A 1,000-ft. high-level platform has already been constructed, and in addition, six or seven long sidings are being laid. The station and yard are brilliantly flood-lit, at the Congress camp, a railway inquiry and telephone office has been installed for public use. An asphalted road is also being provided from Madhi station to the Congress camp. Special sanction has been obtained to run a large fleet of high-capacity buses along this road for the Congress session only, connecting with practically all the numerous trains. The timetable makes provision for 28 trains daily in each direction between Surat and Madhi, with at least six through trains each way. Most of the Indian railways are offering travel concessions for visitors to the Congress.

## THE LOCOMOTIVE IN CENTRAL EUROPE

### *A review of a notable book on the development of the locomotive, 1880-1920*

By E. L. DIAMOND, M.Sc. (Eng.), A.M.Inst.C.E., A.M.I.Mech.E.

A COMPLETE history of the development of the locomotive on each of the German railways now comprising the Reichsbahn, together with the railways of the former Austro-Hungarian Empire, of Alsace-Lorraine, and of Holland, must necessarily be a large and valuable work of reference, but it is not long before the reader of this book\* becomes aware that he has presented before him a pageant of locomotive engineering that can have few parallels in this or any other branch of engineering. As an official publication of the Verein Mittel-europäischen Eisenbahnverwaltungen, the book naturally has not the strong personal flavour of, for instance, the work of the late Mr. E. L. Ahrons, but the story is none the less told with a large-scale perspective and an ever-present sense of its human interest that makes of it a really fine piece of historical writing. Personalities play their part in these pages—von Borries, Garbe, Hammel of Maffei's, Sanzin, to name a few—and their qualities as designers are freely contrasted. Failures are recounted as faithfully as successes, and authoritative reasons advanced for the failures, which, it may be added, belong mostly to the earlier years of the period dealt with in this volume (1880-1920). An interesting example of a failure was the *Erfurter* 4-4-0 2-cylinder simple of 1891, similar in general to the preceding *Hannover* 2-cylinder compound. It had a larger boiler than the latter, despite which its haulage capacity was no greater and its steam consumption substantially higher, thus showing that Ivatt's famous dictum is not necessarily true. The failure was due to defective valve gear design. Using the same boiler, however, von Borries designed a new type of 2-cylinder compound capable of hauling a load 50 per cent. greater at a higher speed with a coal consumption 15-20 per cent. less than that of the *Erfurter* type.

An interesting feature of the book is that the power of the various locomotive types is precisely defined by their ability to haul one specified load at a certain speed on the level and another, usually lower, specified load at a certain speed on a given gradient. Presumably these figures represent average performance, but their bare unqualified statement strikes the English reader, who is used to regarding locomotives as incalculable quantities, rather like racehorses, strangely; it proceeds no doubt from the same instinct for orderliness and rigidity which caused the German authorities to take for so long the modest evaporation rate of 57 kg. per sq. metre per hour as the standard basis for all locomotive power measurements.

Nevertheless, the locomotives of Germany were not always compelled to restrain their latent powers within the inflexible framework of the official German organisation, nor for that matter, the limitations of the permanent way of that period. Some remarkable tests were made in Bavaria in the early nineties, and again in 1906, and some curious high-speed designs were projected. The tests included locomotives from several of the German railways,

as well as a representative of the Hungarian State Railways. All but one were Atlantics, and all were 4-cylinder compounds. Maximum speeds ranging from 80 to 90 m.p.h. were attained, but in the case of one locomotive, a 4-4-4 of the Bavarian State Railways built by Maffei, a maximum speed of 96½ m.p.h. was attained, until recently the highest speed reached by a steam locomotive in Germany. This engine was also remarkable as an early example of streamlining; cab, smokebox front, chimney, and dome were all carried forward in windcutting form. In the case of chimney and dome this was the reverse of what modern research indicates as the more advantageous form.

Another idea generally regarded as modern, was tried more than once, namely the locomotive booster. The first application was as long ago as 1896 to a 4-2-2 2-cylinder compound of the Bavarian State Railways. An extra pair of carrying wheels was provided between the bogie and the driving wheels, on which the auxiliary cylinders drove. The arrangement was remarkable in that these wheels were pressed against the rails by steam pressure and were raised by powerful springs when the booster was no longer required. It appears to have been successful, but was not perpetuated as the day of the single-driver was at an end. The railways of Germany have never been encumbered with out-of-date locomotives. The last 4-4-0 in Germany was built in 1913, and of course the provisions of the Treaty of Versailles accelerated the replacement of old types.

The prevalence of compound locomotives in Europe in the earlier part of the period under review, and their achievements in the high-speed trials already mentioned, is evidence that the comparative failure of the compound in this country was the result of unscientific design. What eventually brought the heyday of the compound to an end in Germany was the advent of superheating, which eliminated the heavy losses due to condensation in a simple-expansion engine using saturated steam, together with improvements in valve gear design which enabled a high degree of expansion to be attained in a single cylinder working at a short cut-off. The firm of Maffei, however, continued to design some noteworthy superheated Pacific compounds, which will be familiar to those who have travelled on the routes along the Rhine to the south. Speeds up to 96 m.p.h. have been attained with these locomotives. At low power they have proved on test more economical than the later standard simple Pacifics of series 03, but at high output their fuel consumption was higher.

German locomotive development has not escaped outside influence. There is first the noteworthy de Glehn 4-4-0 compounds acquired by the Prussian State Railways in 1894. They were built by the Grafenstad firm to the design for the Northern Railway of France, the fame of their performances in France having caused the Prussian authorities to purchase them, just as our own Great Western Railway acquired somewhat later three de Glehn Atlantics. They were the first 4-cylinder compounds in Germany and their excellent performance led to the design of a series of 4-cylinder compounds by von Borries, but without the de Glehn steam distribution arrangement. The movement of the valves for each group of cylinders

\* *Die Entwicklung der Lokomotive* (The Development of the Locomotive). Part II in two volumes, one of text with illustrations and the other tables and folding plates, covering the period 1880-1920 (Part I of this work, also in two volumes, was published in September, 1930 and covered the period 1835-1880.) Munich and Berlin: Verlag von R. Oldenbourg. Each 12 in. x 8½ in. x 1½ in. Vol. I contains 495 pp.



was derived from an inside Heusinger valve gear by means of a pivoted shaft, but each crosshead carried its own rocking arm. It was one of these locomotives, an Atlantic, which was tested at the St. Louis Exhibition in 1904 and thereby gained world fame. This engine was fitted with a Pielock superheater, giving, however, only a low degree of superheat. There is no doubt that German locomotive development owed much to the original de Glehn compounds, but the genius of von Borries enabled him to incorporate the essential features which had contributed to their success in designs of his own more suited to Prussian requirements, so that ultimately on comparative trial his own later designs proved more successful than the last of the de Glehn Atlantics built for Prussia by the Grafenstadt firm.

Another noteworthy instance of foreign influence, which again had a permanent effect on German locomotive design, was the importation in 1900 of two Baldwin 2-8-0 goods engines and two 4-cylinder Vauclain compounds from America by the Bavarian State Railways. They were not in themselves successful in German surroundings, but Hammel of the Maffei firm, to whom, as this book emphasises, locomotive development in Germany owes so much, immediately recognised the advantages of bar frames from the point of view of simple and rapid construction. Von Borries had already built some of his Prussian compounds with bar frames for the front part

of the locomotive in order to secure easy accessibility to the inside motion, but in 1903 the Bavarian State Railways went over entirely to bar frames.

English influence is recorded in the case of the Austrian railways. In 1903 Gölsdorf produced a handsome 2-cylinder compound, whose smooth exterior and even lines were obviously a result of a stay in England for the purpose of study. The English reader will feel that it was a happy chance that ordained that the Austrian railways of that day should be the recipient of English ideas of symmetry. Whatever may have been its effect upon the dryness of the steam, the Austrian double dome connected by a large pipe above and parallel with the boiler, was certainly one of the most hideous notions ever inflicted upon the long-suffering steam locomotive. It is interesting to notice that in several places in this book the idea of transparency is referred to as a criterion of beauty in a locomotive. Those who are familiar with the modern German Pacifics as seen from the low platform level of German stations, will appreciate the extent to which they conform to this ideal, for the clear view right through the driving wheels is most striking.

There is a section at the end of the book briefly reviewing technical developments of individual features of the locomotive, boiler, regulator, smokebox, valve gear, &c., which is in itself a most valuable source of information, and a separate volume contains tables of dimensions.

## TELEPRINTER PROGRESS ON THE L.N.E.R.

### *First teleprinter installation on British railways with automatic exchange at Liverpool Street station*

**T**HE introduction of the teleprinter may be said to have marked a new era in the art of telegraphy.

Over 11 years ago the London & North Eastern Railway pioneered in installing machine page printing telegraphs for railway service with the dual objects of speeding up transmission and securing economy. In 1926 the company's first circuit was established between Liverpool Street, Cambridge, and Norwich, and the results were so satisfactory that at the present time there is a considerable number of machine printing telegraphs on its system. As a result of the experience that was gained, it was considered that if an automatic switching system could be devised a considerable extension of such telegraphs could be made, and the majority of the old single needle instruments dispensed with. A manual switching system could have been installed with which the various extensions could have been put through as desired, but something more expeditious was required for peak traffic. Automatic switching has, however, been developed during the last year or two in the U.S.A. and the British Post Office has also developed a system. It is now proposed therefore to provide an automatic teleprinter exchange at Liverpool Street station and 43 page-printing telegraph instruments at 25 of the main stations in the Southern Area, as shown on the accompanying diagram.

#### Method of Working

At each teleprinter location in the various telegraph offices a dial sub-set is to be provided, with a dial exactly similar to that used in automatic telephony; and the method of operation will be as now described.

#### Originating Calls

The caller dials the number of the wanted party. The movement of the dial off normal starts up the motor and

lights the red engaged lamp on the dial box; no operation other than dialling is required. Should the called party be busy, the word "busy" is printed on the caller's machine, and the equipment and selector at Liverpool Street re-set, so that he may dial another number immediately, without first releasing the original call. If the called party is available his machine is automatically started up and the answer-back device tripped, so that the caller receives the called party's number as confirmation of the completed connection. The caller may now communicate with the called party or leave a message on his machine, whether he be present or not. At the end of the communication, either party may clear the connection by pressing the release key for approximately one second.

To call the supervisor when connection has not been established, the caller dials the single digit 0. On receipt of this, the selector is restored to normal, and the caller's lamp flashed on the supervisor's position. The latter answers the call by operating the relative "print" key and hence a relay in the calling line circuit. Communication may now begin. At the end of it the operator withdraws by restoring the "print" key.

#### Incoming Calls

No operation is required of the called party, as his teleprinter motor is started up automatically, and unless the caller desires an immediate reply his message may be left on the called machine without any assistance whatever. When anyone is called the red and green lamps on the dial box light, indicating an incoming call in progress. It is possible, however, for the caller to attract the attention of the called party by a key on his teleprinter, which causes a bell to ring at the called party's station and to continue until the next signal on the line. When the called

party answers by transmitting his number, or by any other standard method, the bell ceases and communication may begin.

#### Assisted Calls

The supervisor may be called in by any line at any time, before or during a communication. To do this before a connection has been established, the caller dials 0, flashing his calling lamp on the supervisor's position. The supervisor will answer by operating the "print" key associated with that line, putting her in communication with the caller, who may print his requirements to her. The function of the supervisor is to offer urgent calls to engaged parties and, for this purpose, she is provided with line keys with which to enter any established connection and offer the call to the wanted party.

When offering an urgent call to an engaged party the supervisor may hold the calling and wanted parties' "busy" by operating their "busy" keys on her position. She may also set the calling party's connector by dialling the wanted party's number, in which case the calling party will be switched through to the wanted party directly he becomes disengaged. The wanted party's answer-back device will then be tripped and his number printed on the caller's machine. The supervisor receives a visual signal when connection has been completed; she can then restore the "busy" keys to normal. If, on offering an urgent call, the supervisor finds that the existing connection cannot be broken down immediately, she would find out when it was likely to become free, and inform the calling party. The wanted party may still be kept from any further calls by the supervisor operating his "busy" key. If it will not be long before the established connection can be completed, the supervisor may dial the caller's line on to the wanted party's line and throw the "busy" key; the two parties will be connected directly the established connection is broken down, as above explained. The supervisor may also forcibly break down an established connection by entering the circuit and operating her release key for approximately one second. This means that if a party accepts an urgent call when offered all the supervisor has to do is to operate her release key, when the wanted party will be connected immediately to the caller.

#### Party Line Calls

On lines having two stations, either party may call the other by dialling a single digit number allocated to him. It is proposed to employ digits 1 and 2 for this purpose. The sub-station equipments on these lines are arranged to respond to their predetermined number, on receiving which they cut in the teleprinter. If, however, any digit over 2 be dialled, the party not originating the call will have his machine cut out of service and the message printed by the other one will not be recorded thereon. In making a call from such a line to any other line, the wanted party's number is dialled in the ordinary way. When making a call to one of the stations on a party line, the caller dials the number allocated to that party, each having a different one. The line and connecting circuit associated with the party line are arranged to send out the necessary code to select the required party, so that the caller merely dials a number, the exchange automatically calling in the proper party. This is done by the help of the auto-sender, used for sending "busy" back when the wanted party is engaged. This machine will have two additional cams for selecting the stations on a party line and, according to which cut-off relay is operated by the calling party, the proper cam will be selected for sending out the discriminating code. On receipt of this the wanted party's machine will be started up, and his

number printed back to the caller, the unwanted party's machine being cut out. A special feature is that when two parties on the same line are communicating with one another, it will be possible for the supervisor to enter the circuit and offer an urgent call to either party, or monitor as the case may be. This is made possible by a special type of repeating circuit.

#### Reasons for Adoption of Fully Automatic System

Automatic switching in telegraphy is a comparatively recent development and has not been used previously outside the British Post Office and the U.S.A. The main consideration in proposing a fully automatic system for this network was the very high traffic expected on the lines. From figures provided, working on the basis of a minute per call, it was obvious from the outset that any scheme of manual connection would involve connecting and clearing times which would be a considerable percentage of that employed in actual communication. It is estimated that any scheme of manual inter-connection would require approximately 25 sec. per message for calling, connecting, and clearing. Apart from the heavy work entailed on the operators at Liverpool Street, the holding time of each line would be increased by approximately 50 per cent., which could not be countenanced at all. In the proposed automatic system connecting and release times should not exceed 10 seconds, with an average of about 7.5 seconds.

Even with this saving of total holding time it is felt that a good deal of operating routine will be involved and the proper segregation of messages into urgent and non-urgent will be essential for ultimate satisfactory operation. Two methods will be adopted for the alleviation of temporary peaks on the more heavily loaded lines, either by storing all messages for these stations on special teleprinters at Liverpool Street, or by using re-perforators there. Messages received in this way on the teleprinters would need to be re-transmitted, but the punched tape from the re-perforators could be put on an automatic sender during slack periods.

The results of the working of this comprehensive scheme will be awaited with much interest, representing as it does one of the most important contributions to the application of the latest scientific knowledge to the improvement of telegraphic communication on the railways. The scheme will be carried out under the direction of Mr. R. J. M. Inglis, Engineer, by the Signal and Telegraph Engineer, Mr. A. E. Tattersall, to meet the wishes of Mr. C. J. Selway, Passenger Manager (Southern Area), L.N.E.R., and a contract for the Teleprinter Exchange at Liverpool Street, has already been placed with Creed & Co. Ltd., Telegraph House, Croydon.

#### Southern Railway London Terminal Traffic

An indication of the increase in traffic brought about largely by electrification is given by the following figures of passengers arriving at the London terminal stations of the Southern Railway in 1927 and 1937:—

	1927		1937	
	In 24 hr.	Heaviest hour.	In 24 hr.	Heaviest hour.
Passengers arriving at—				
Blackfriars & Holborn ..	24,020	7,344	36,571	14,892
Cannon Street ..	27,632	10,039	41,672	18,936
Charing Cross ..	23,651	5,244	54,816	17,413
London Bridge ..	56,539	18,894	93,202	29,489
Victoria ..	50,438	10,207	60,270	17,215
Waterloo ..	62,378	15,170	75,335	23,638
Total ..	244,658	66,898	361,866	121,583

## WOODEN RAILS IN NEW ZEALAND

*An experiment of 1864 using flangeless wheels with guide wheels on broad-gauge timber rails carrying locomotive-hauled passenger and goods traffic*

*(From our New Zealand correspondent)*

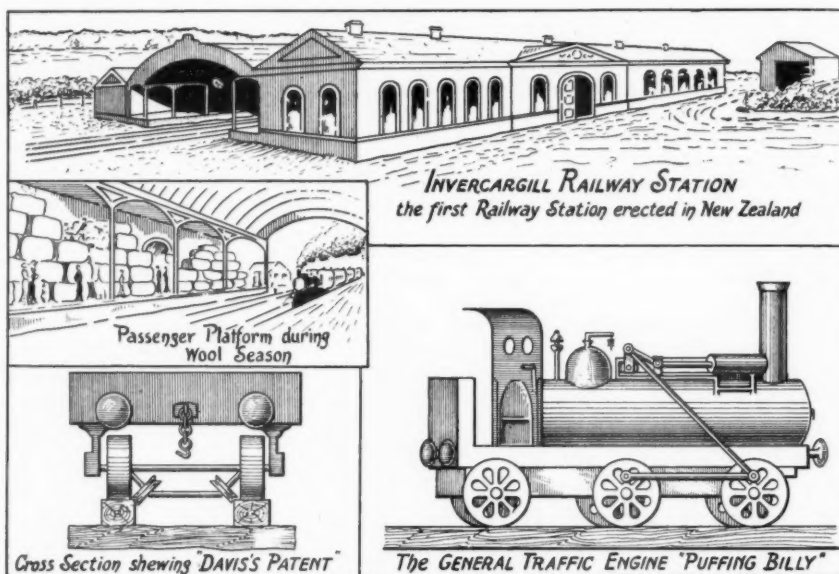
**B**EFORE 1870, when the General Government took control of all provincial railways in New Zealand, provinces had begun independent railways of various gauges and standards. Among these, the Southland Provincial Government had been the most unorthodox. It decided to build what was known as "The Oreti or Great Northern Railway" from south to north of the Southland Province, connecting the port of Bluff (New Zealand's southernmost port) with Invercargill, the principal town of Southland, and continuing north through Winton. But whereas the Bluff-Invercargill 17-mile section was solidly built on the British system, using 60-lb. rails carried in cast-iron chairs above the sleepers, the Northern extension was the subject of experiment on economical grounds.

Thus, in 1864, a section of 8 miles from Invercargill to Makarewa was brought into use\* upon which the rolling-stock had flangeless wheels and ran upon a wooden permanent way. The system (called the Davis system after its originator) was chosen out of many proposals because it promised to make use of certain natural advantages peculiar to the locality and at the same time provide a railway at a minimum of expense. In the model submitted by Mr. Davis, it was seen that the flangeless wheels which carried the vehicles were kept on the rails by guide-wheels. These were set below the axles at an angle of 45 degrees, and their concave (V-shaped) treads, fitting round the upper inside corners of the wooden rails, served the purpose admirably in all the model tests made before the plan was accepted.

As the route of the line was through dense Southland beech forest from which both sleepers and rails could be cut, the building of the railway would serve the triple purpose of clearing the land, providing local employment, and supplying a complete permanent way. The sketches made by Mr. C. Baker give an excellent idea of the appearance of the engine used and the arrangement of the wheels on the rolling-stock. Although details of general measurements are not available, some guide is given from the gauge, which was 5 ft. 3 in., and the size of the wooden rails, each approximately 10 in. by 10 in. by 9 ft.

Mr. Baker's comments upon the railway when in actual operation are particularly interesting. He said that "one among the very fallacious ideas as to economy in maintaining the permanent way was that when a side of any wooden rail became worn it could be turned until at least

three sides had withstood traffic. The expectations of the Government and contractors were, however, never realised, for, by the time the first section was handed over, it was found that the rails were then practically worn out. The weight of the rolling stock during construction had reduced them to a spongy, splintered state, and it was evident that one side was no better than the other. This was



Illustrations based on sketches entitled "Old Invercargill, 1864," by C. Baker

the first blow, as it practically meant a relaying of the whole of the rails, and then apparently for a short existence only. Added to the difficulty of haulage was the fact that the rails being worked to such a yielding state, the engine wheels and those of heavy-loaded trucks, would make beds for themselves when stoppages of any moment took place in ordinary traffic. A further serious fault which developed during working conditions was the swelling of the rails as a result of rain. This condition had the effect of jamming the train wheels on account of the resultant narrowing of the gauge, and consequently at times, it was impossible to operate traffic.

These were among the considerations which weighed with the Provincial Government in deciding to abandon this form of railway construction, and, although a contract for another section had been let for £30,000, it was not proceeded with. But the contractors, who sued for breach of contract, won their case and were paid £35,000. In sharp contrast with this experience is the optimistic account of the opening in 1864 published in one of the local papers. Referring to the question of the capability of timber to stand the wear and tear of a locomotive running over it, the newspaper remarked: "Fortunately, this problem has been solved. Mr. Davis had the contract for the formation

\* The opening was recorded briefly in *The Railway News* of January 14, 1865.—ED. R.G.



of a piece of metallised road near the Mokomoko, and in order to facilitate this work he constructed a wooden line of rails and placed upon it a small locomotive—the *Lady Barkley*—which daily drew a number of trucks heavily laden with broken metal. This engine ran for several months, and, at the expiration of that time, it was found that so little had been the wear and tear of the rails that even the saw marks had not been effaced. As far as regards adhesion, it has been proved that wood is superior to iron, providing the wheels of the rolling stock have a separate action."

The rolling stock of the Oreti Railway consisted of three locomotives—a large one of ordinary type so far as driving power was concerned; a medium sized and general utility engine (named *Puffing Billy*) having its cylinders placed on top of boiler as in an ordinary traction engine, with, however, crank connection to driving wheel (see illustra-

tion); and a small engine for use as pilot or shunter, as the case might be. There were three or four carriages of the cross-compartment style, with side doors opening outwards. These were locked on the passengers with a T-shaped key, the guard having to make an outside visit from compartment to compartment, using the lateral step outside and clinging to the side of the carriage door handles, &c. Ordinary trucks then completed the equipment.

The whole line was afterward built to the New Zealand standard 3 ft. 6 in. gauge, and became part of the Government's South Island Main Line and Branches system. The 5 ft. 3 in. gauge rolling-stock was purchased by the New South Wales Government for use on the railways there, but the vessel conveying the main portion of the consignment was wrecked, and that was the last of broad gauge so far as New Zealand was concerned.

## THE WIESINGER SYSTEM OF HIGH-SPEED RAIL TRANSPORT

*A lightweight railcar with inclined wheels, demonstrated in model form at Zurich*

ILLUSTRATIONS and some additional details are now available, through the courtesy of *Pennyfare*, the staff journal of London Transport, of the trials with a one-tenth size model of the high-speed railcar and special track invented by Professor Kurt Wiesinger, of Zurich. This invention, which is remarkable for its safety form of rail and wheel-positioning, was described in *THE RAILWAY GAZETTE* of July 12, 1935, and a brief reference to the

the track when travelling at an abnormally fast rate, despite this drastic reduction in weight, wheels and track rails are inclined inwards at an angle of about thirty degrees. This innovation allows exceptionally steep banking at curves, which can thus be negotiated at high speeds, and practically eliminates the possibility of derailment.

A speed of 70 m.p.h., which is equivalent to 230 m.p.h.



Above: The very sharp cant of the rails on this curve is necessary when the model railcar is rounding it at a scale speed of 230 m.p.h.

Right: Hand-starting the petrol-driven model on its 900-ft. run



trials with the model was made in our issue of July 23, 1937, on the occasion of Professor Wiesinger's twenty-fifth year of association with the Technical High School of Zurich.

Professor Wiesinger's plans provide for the construction of railcars about one-fifth the weight of ordinary railway coaches, inclusive of freight; but to enable them to hold

for a full-sized car of this design, has already been attained by one of Professor Wiesinger's 4-ft. scale model railcars on a miniature track, about 900 ft. long, at Zurich. Power for one of these experimental cars is provided by a miniature petrol motor, while the other is equipped with a variable pitch propeller which can be used also as an air brake.

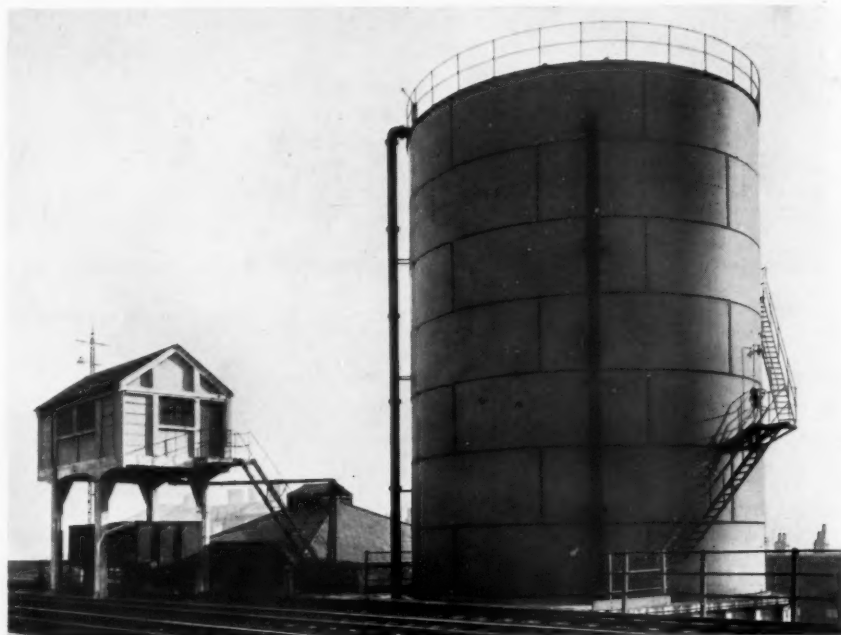
## WATER SOFTENING ON THE L.N.E.R.

*Plant having a continuous hourly capacity of 40,000 gallons has recently been installed at Spitalfields, London*

**B**Y the courtesy of Sir H. Nigel Gresley, we were recently able to inspect the water softening plant illustrated. It is a lime-soda water softener supplied by the Permutit Co. Ltd., and installed at Spitalfields in the vicinity of Liverpool Street station. The plant is of the cylindrical type, built for a continuous hourly capacity of 40,000 gallons. The raw water is drawn from the Metropolitan Water Board's mains, and the initial hardness of 16 to 18 degrees Clark can readily be reduced to 3 degrees or less by the softening process. The settling tank is of riveted mild steel construction with dimensions of 36 ft. dia. by 46 ft. 9 in. high, allowing a total settling time of 4 hr.; the tank is erected on a reinforced concrete structure so that the tank base coincides with rail level, and the Permutit P.M. type ground-operated lime and soda measuring apparatus is housed in an arch below the track.

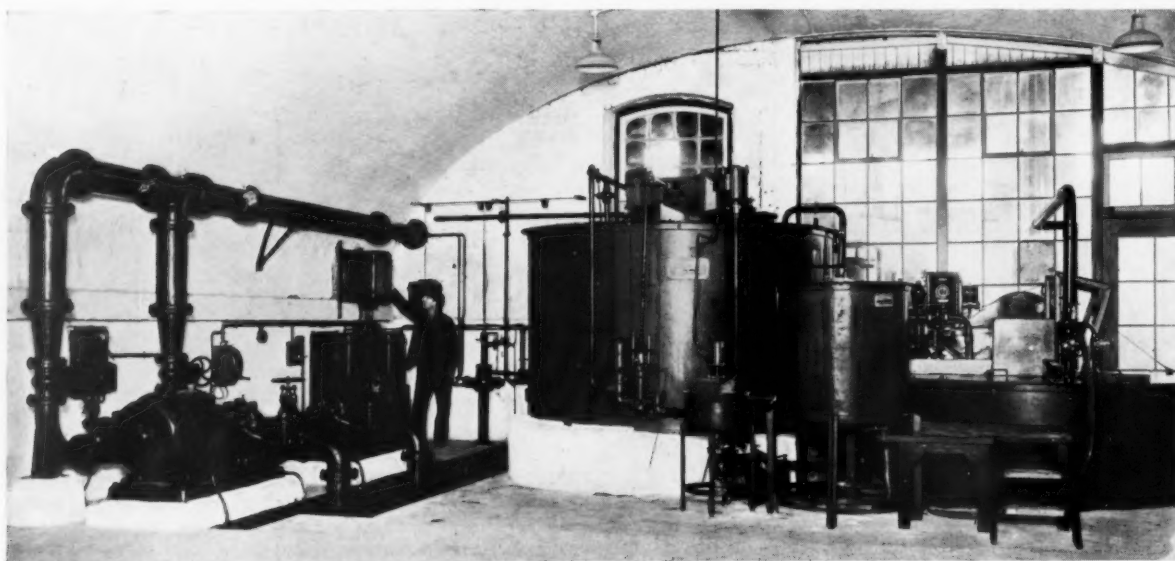
This apparatus is arranged to give a proportionate dosing of lime and soda at all rates of flow, by the use of a special contacting water meter fitted in the pipeline, which carries the hard water to the inlet point on the settling tank.

The lime and soda emulsion is stored in a cylindrical



*Plant viewed from rail level, showing the filter press housing*

mild steel tank measuring 9 ft. dia. by 5 ft. 6 in. deep, and the emulsion is kept permanently in an evenly mixed condition by means of a motor-driven agitator. At the base of the tank, there is a valve box housing the positive type discharge valve, which is actuated by a powerful solenoid attached to a bracket at the top of the tank.



*Chemical proportioning and measuring gear, and pumping equipment at ground level*

The solenoid is wired up with the electrical contacting meter on the crude water inlet pipe, and the arrangement of the meter is such that the contacts close after the passage of a unit number of gallons. At each contact the solenoid is energised, thereby opening the valve, and the discharge of lime and soda takes place into a dilution tank fitted below. The measured lime and soda emulsion is diluted in this tank by soft water, and the diluted mixture is pumped continuously to the raw water inlet point on top of the softener by means of a specially constructed reciprocating pump which is mounted on the side of the lime and soda tank.

The arrangement of this measuring gear is such that dosage is always proportionate, since if the flow of water to the plant diminishes, a reduction occurs in the number of meter contacts, and consequently the number of valve discharges is correspondingly reduced. Conversely, if an increase in flow occurs, the valve is opened more frequently to cope with the increase. Alongside the lime and soda storage tank there is mounted a lime slaking tank measuring 9 ft. dia. by 3 ft. 9 in. deep, and an auxiliary measuring equipment is also provided for the

addition of a coagulant, sodium aluminate. The hard water and the measured chemicals enter the settling tank by way of the downtake pipe, which reaches from the top of the settling tank to a point within the sludge collecting cone at the base of the tank, and agitating gear is fitted to ensure even mixing and to accelerate "floc" formation. On reaching the base of the downtake, the water begins to rise slowly in the tank towards a wood wool filter. The filter effects final clarification, and the accumulated sludge in the sedimentation tank is discharged from the cone bottom at the required periods.

Beneath the base of the settling tank, there is provided a reinforced concrete sludge pit into which the sludge is discharged and settled, and a floating arm is arranged for the draw-off of the resulting clear water. The thickened sludge is pumped through a filter press installed within the housing which appears to the left of the settling tank in the first of the accompanying illustrations. The use of the filter press considerably simplifies the disposal of the sludge, since by its use the liquid sludge is converted into sludge cakes which can readily be handled and transported.

## NEW BRITISH-BUILT TANK LOCOMOTIVE FOR MEXICO



THE locomotive illustrated herewith was recently completed at the works of Hudswell, Clarke & Co. Ltd. of Leeds to the order of the Eagle Oil and Shipping Co. Ltd. for working in its oil refineries in Mexico. It is built for the 4 ft. 8½ in. gauge, and is of a powerful type, developing a tractive force at 85 per cent. of the boiler pressure, of 29,000 lb. The cylinders drive the third pair of coupled wheels, and steam is distributed to them by piston valves actuated by Walschaert's gear. The boiler is of the Belpaire pattern, fitted with steel interior firebox and steel tubes. The water space staybolts are made of Brown Bayley's Longstrand steel, and the inside steel firebox plates are of a special quality supplied by the firm of Colvilles Limited. The boiler is fitted with two 2½ in. diameter Ross pop safety valves, and lagged with asbestos mattresses manufactured by J. W. Roberts Limited of Leeds. Other fittings include Davies & Metcalfe's duplex top check and stop valve, and Gresham and Craven's No. 9 injectors.

The engine burns oil as fuel, using Holden's patent oil fuel apparatus, supplied by Taite and Carlton. Pyle

National electric lighting equipment is used, and the central couplers are of the M.C.B. type. The locomotive has steam brakes in conjunction with Westinghouse air brakes for operating the train.

The following are the principal particulars:—

Cylinders, dia.	..	..	20 in.
Piston stroke	..	..	24 in.
Wheels, coupled, dia.	..	..	3 ft. 9 in.
„ bogie, dia.	..	..	2 ft. 2 in.
Wheelbase, coupled	..	..	13 ft. 6 in.
„ total	..	..	27 ft. 0 in.
Boiler, heating surfaces:			
Tubes	..	..	1,150 sq. ft.
Firebox	..	..	112 „
Total	..	..	1,262 „
Grate area	..	..	24 „
Boiler pressure	..	..	160 lb. per sq. in.
Water capacity of side tanks	..	..	1,750 gallons
Fuel capacity of oil tank	..	..	3 tons.

The engine in working order weighs 66 tons, and as will be noted from the above particulars, the equipment is of a thoroughly modern character throughout.



## AUTOMATIC BLOCK AND CAB SIGNALLING IN FRANCE

*A new and completely up-to-date system has been installed between Caen and Cherbourg\**

By JEAN G. WALTER, Signal Engineer

IN 1934 and the early part of 1935 the then French State Railways brought into service a colour-light automatic signal installation between Caen and Cherbourg, on the main line from Paris to that important Normandy port. This was to improve traffic facilities, particularly at such times as when trains had to be run in two or more parts to serve arriving or departing ships. The line had previously been

worked by telephone block between Caen and Sottevast, 71 miles, and by a simple manual block thence to Cherbourg, 11 miles, with 26 signal boxes in all, 9 being intermediate block posts. The only block signal used was the red disc, or outer deferred stop signal, seen in Fig. 1. This is placed at some distance from the block post, and when "on" requires the driver to reduce his speed so as to be able to stop short of any obstacle he may meet and, even if he finds the line clear, to stop before reaching the point protected by the disc. He may start again only with the signalman's permission. The red disc is placed at "danger" automatically when a train passes it by an apparatus called the Aubine treadle.† When the block section ahead is occupied, the signalman keeps this outer signal "on" and exhibits a red hand-signal, supported by detonators, to



Fig. 1—Red outer (deferred stop) signal, used with manual and telephone block, automatically replaced by passing train

an approaching train. Manual block apparatus is still in use between Mantes and Caen but it is intended to replace it by automatic signalling in due course.

### The New Signals

When the adoption of automatic signals was decided in 1930, the signal aspects in force were those derived from the *Codes des Signaux* of last century, most of them comprising two lights at night. Thus "stop" (at a block signal) was shown by a red light and a green light; "caution: next signal at danger" by two green lights; and "proceed" by two white lights. A reform of the *Code* had by then been worked out, and was formally approved by the Minister of Public Works on August 1, 1930, but the

date of its application was unsettled. It was accordingly decided to construct the signals so as to give the old aspects, but in such a way as to be readily convertible to the new system with minimum expense. Fig. 2 shows how this was done. The signals were built as double units, with two posts, so that to make the change it was necessary only to take one away and alter the colours



Fig. 2—Colour light signal after adoption of new aspects with left half out of use and marker light added to right half

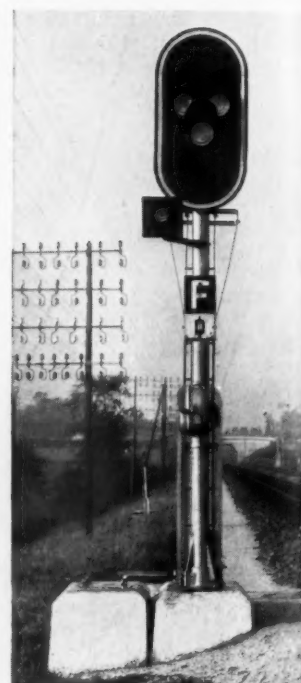


Fig. 3—Colour light signal as finally converted with "F" (stop and proceed) sign and "D" sign, indicating that electric detonating machine is provided

in the remaining one to give red, yellow, and green (single light) indications; the removed unit was available for use in further new work. At the same time a lunar white marker light was added. In Fig. 2 the lenses of the disused unit have been covered over, and in Fig. 3 the altered signal is seen, complete with new background plate. In new signals the lenses are now placed in a vertical line, with the red in the centre. The change from the old to the new aspects took place in 1936. With the manual and telephone block systems there were 50 block sections, counting up and down lines separately; there are now 186.

### Electrical Equipment

Signal lamps and track circuits are fed from cadmium-nickel accumulators, trickle-charged through metal rectifiers with self-regulation, a system which has been found

\* Until the end of 1937 this line was part of the French State Railways system

† See the description of French signalling and block working in THE RAILWAY GAZETTE, December 28, 1934

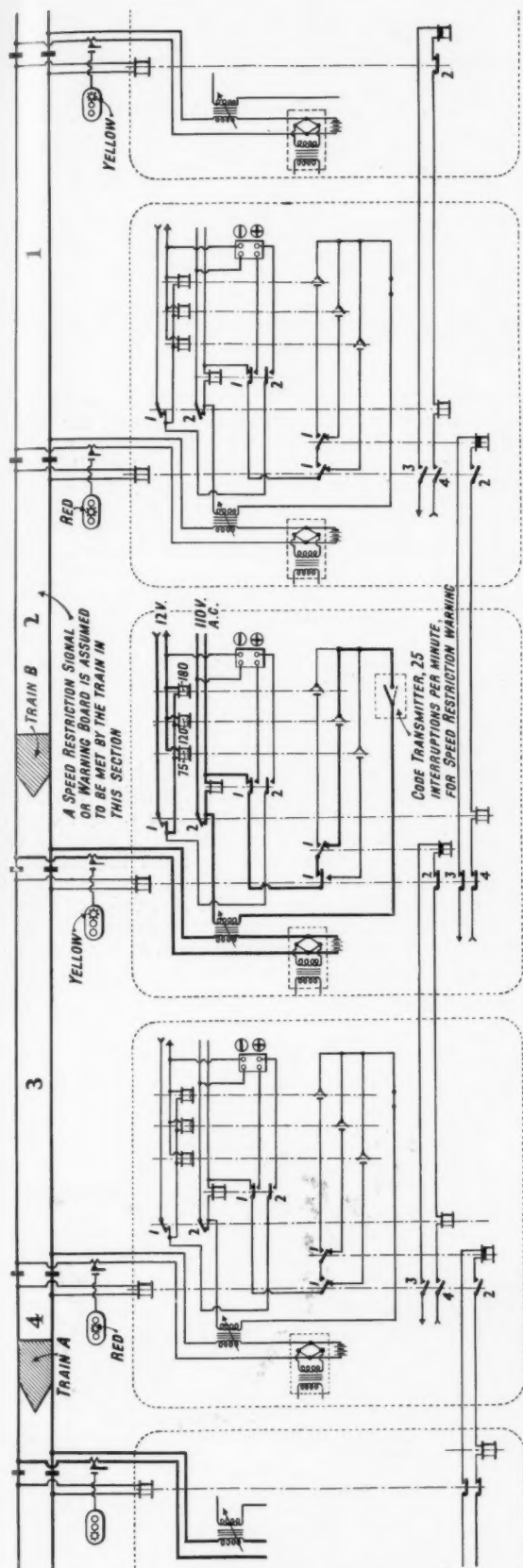


Fig. 4—Electrical connections of automatic block and cab signalling on former French State Railways

very satisfactory. Current is distributed in both directions from each station, generally as 3-phase, a.c. 110 volts between phases, transformed up to 600 volts. At each signal a transformer between one phase and neutral provides low voltage current for lamps, relays, and battery charging. If power fails, a frequent occurrence at some places, the accumulators continue to feed the installation and are fully recharged through the self-regulating rectifier when power is restored. Results have been satisfactory, maintenance charges being low. Approach lighting is used, except for marker lights and absolute stop signals protecting points and crossings, which are, of course, controlled from stations or signal boxes. Special care was taken to ensure a high shunt effect being obtained, so as to provide efficient protection for the light railcars, numerous on this line at certain periods of the year.

### Continuous Cab Signalling

The question of cab signalling was specially investigated when this installation was being planned. The system in general use in France, approved by the Government 15 years ago but used long before that, consists of a ramp near the signal which is electrically charged when the latter is "on," a brush on the locomotive transmitting the current to a releasing apparatus in the cab which sets a whistle blowing until the driver stops it. On some lines the ramp is electrified, positive or negative, according to the position of the signal, enabling a record of both positions to be made on the speed recorder band. This is a great help to the drivers but is not so effective as other types of cab signalling developed on foreign railways. The French Government, having invited the railways to study those systems, authorised the State Railways to try the continuous inductive type, well known in the U.S.A. The track-circuit equipment for the Caen—Cherbourg signalling was accordingly designed to allow of this, the relays being given sufficient spare contacts.

The principle of the American cab signalling will be familiar to readers.\* Coded current of pre-determined frequency is transmitted through the rails, according to the signal to be displayed on the engine, on which this current is picked up inductively by a receiver, transformed, amplified, and decoded. Although the colour-light signals have three aspects the cab signals have four. Red appears when a train is travelling in an occupied section, under Stop and Proceed rules; yellow when it is approaching a stop signal, and green and a yellow letter "P" (*préavisement* = preliminary warning), when the signal ahead is at "caution." Green alone means "proceed." The method of adding reduced speed signal aspects for curves, junctions, permanent way restrictions, &c., to the ordinary block signal aspects, customary in France, led to some difficulties in adapting this cab signalling to the requirements.

The new double-yellow reduced-speed aspect† is given only when a sharp turnout is to be negotiated. All other speed reductions are given by numbered warning boards, showing the permissible speed in km. p.h. A driver thus has to obey the block signal and the reduced-speed signal or board, if provided. In order to convey this additional information to him, the cab signal indication is made flashing if a speed restriction announced by a speed board is to be called for, but remains steady if there is none. The electrical connections for this are shown in Fig. 4. A train is travelling in block section 4, and another in block section 2, and therefore approaching a "caution" indication. In this section, however, we must assume that the driver is to encounter a speed restriction warning.

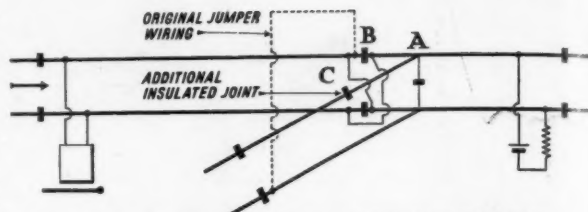
\* See THE RAILWAY GAZETTE, March 22, 1935

† See THE RAILWAY GAZETTE, November 22, 1935

and it will be seen that an interrupter is inserted in the track-feed primary circuit, producing 25 flashes per min. on the cab signal and emphasising the special circumstances.

The experiments with this system proved very successful. It was found necessary to arrange the insulated joints at points very carefully, as shown in Fig. 5, to ensure continuous reception on the locomotive and prevent a momentary red cab signal from appearing at such places. The necessary modifications have been made in the track circuits, and experimental trials are to be made with locomotives equipped for the purpose, where they will no doubt prove a valuable aid to safety, especially in foggy weather. Where the locomotives leave the continuous cab-signalling area a special track circuit is provided, coded to give 240 impulses per min., which automatically puts the continuous equipment out of action and brings in the ordinary ramp and brush system.

Electric detonating machines are provided at the automatic signals, giving a loud report if a "stop" indication is overrun. The guard can cancel this action when a train requires to enter a blocked section under caution, as indicated by the plate marked "D" on the



NOTE: WITH THE ALTERED CONNECTIONS THE CAB SIGNALLING CURRENT IS OBLIGED TO TRAVEL ALONG THE PIECE OF RAIL AB, WHEREAS WITH THE OLD MOST OF IT PASSED BETWEEN A AND C, RESULTING IN LOSS OF RECEPTION ON THE LOCOMOTIVE AND A MOMENTARY RED CAB-SIGNAL INDICATION

Fig. 5—Diagram showing wiring at points to ensure continuous reception of cab signal current

signal post (Figs. 2 & 3). Another plate marked "F" (*franchissable* = passable) serves to show that the signal is an automatic one should the marker light be out. Absolute stop signals bear the sign "Nf" (*non-franchissable* = not passable), and are controlled from a station or signal box.

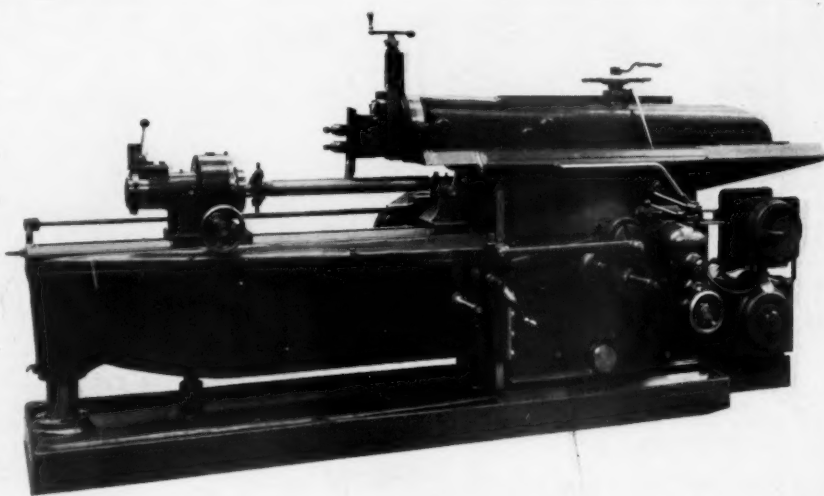
## A NEW SPLINE SHAPING MACHINE

*One of a useful range manufactured by Ormerod Shapers Limited*

THE firm of Ormerod Shapers Limited, Hebden Bridge, Yorks, has recently built a range of shaping machines specially adapted for machining splines from the solid, where the splines run up against a flange or shoulder of the shaft. The machine illustrated has a stroke of 26 in., and work pieces 54 in. long by 15 in. dia. may be admitted between centres. The machine is driven from a 10-h.p. motor, through a powerful friction clutch and 9-speed gearbox. The ram is extended to enable short splines to be machined at a maximum distance from the tailstock, and is internally ribbed to prevent deflection when working in that position. The ram guides are chilled, and forced lubrication by pump is delivered to the ram guides, link motion, and gearbox. The knee type table is elevated on the main-frame through hand-operated gearing fitted with ball thrust washers to facilitate motion. A supporting column of large diameter is mounted at the end of the baseplate to ensure freedom from deflection under cut. The headstocks are mounted on inverted guideways of ample width; the fast headstock has a spring-loaded centre with lock, and is dowed in position. The driving head is adjustable to the length of the work.

The driving spindle is machined from a high tensile solid steel forging, and driven through worm and worm wheel gearing with provision for taking up any backlash which may develop. Pick-off gears give a range of 10 feeds in addition to

hand adjustment. A hardened and ground index plate is countered in the spindle, and can be divided in 2, 4, or 6 divisions to suit the requirements of the user. A hand operated plunger engages with the index plate, ensuring that splines are equally spaced to a high degree of accuracy. The whole of the machine is mounted on a well ribbed baseplate of pan shape for the collection of cuttings, lubricant, &c. The machine illustrated requires a floor space of 13 ft. by 5 ft. 6 in. and weighs 85 cwt. It is also manufactured in other sizes, namely 18-in. and 12-in. stroke machines, admitting work 42 in. long by 12 in. dia., and 30 in. long by 12 in. dia., respectively.



The new Ormerod spline shaping machine



## NEW SENTINEL LOCOMOTIVES FOR THE EGYPTIAN STATE RAILWAYS

*Axle-hung geared steam engines, giving individual drive to two axles, have been adopted in locomotives of otherwise generally standard design*

**F**OUR locomotives have recently been supplied to the Egyptian State Railways by the Sentinel Waggon Works (1936) Limited. Classified in accordance with electric locomotive practice, they rank as the I.A.A.1 type, each driving axle having its own independent engine unit, and the driving wheels not being coupled; apart from this last feature they would, in steam locomotive notation be referred to as 2-4-2 locomotives. Two of the locomotives are arranged for coal firing, and two for burning oil. The essential feature of the design is the use of totally enclosed force-lubricated engine units, geared to and suspended from the driving axles, in place of the conventional cylinders and coupling and connecting rods of the ordinary locomotive.

There are two engine units, each with cylinders 11 in. dia. by 12 in. stroke, mounted on the driving axles in a similar manner to axle-hung electric motors, and suspended from the main frames at the cylinder end by a transverse beam supported on rubber springs to take the axle torque and absorb any shocks transmitted from the rail. The arrangement provides a three-point suspension, so that unequal movement of the axleboxes in the guides when on uneven track cannot throw any stresses upon the engine or suspension system. To compensate for the movement of the axleboxes in the guides, flexible joints of Sentinel design and manufacture are provided in the steam and exhaust pipe system. The joint, which consists of a ground spherical end housed in a spherically seated flanged connection, is shown in one of the accompanying drawings. Steam pressure in the pipe line forces the ball end more firmly on its seat and assists in maintaining tightness. Many of these flexible joints have been supplied for use on locomotives and railcars in all parts of the world during the last twelve years, and they have always proved trouble-free in service.

In order to compensate fully for possible movement in all planes, three joints of this type are fitted in each steam and exhaust pipe line. The mounting of the engines on the axle makes it possible to arrange the bearings outside the wheels, where they are accessible for greasing and maintenance. Each driving axle is independently driven so that coupling rods are not required. These wheels, fitted with Timken roller bearings, are the same diameter as those of the tender, so that the same tyres can be used for both. The main crankshaft bearings for the engine unit are of the SKF double-row self-aligning roller pattern. The boiler is a duplicate of that of the 4-4-0 type passenger locomotives recently constructed by the North British Locomotive Co. Ltd., for the Egyptian State Railways. The working pressure, however, is increased to 200 lb. per sq. in. As far as possible, all boiler mountings and other details are duplicates of the corresponding items on the 4-4-0 type locomotives.

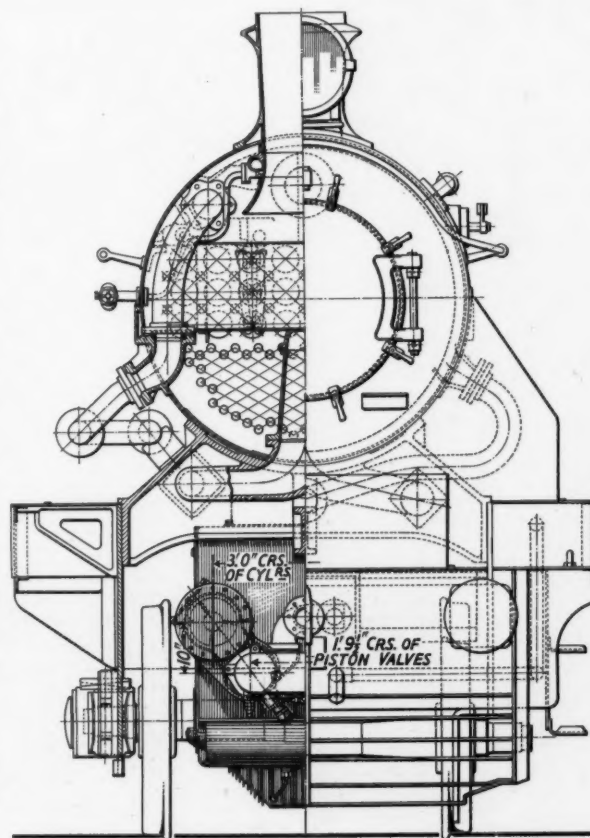
### The Engine Units

The engine units are designed throughout to give reliable trouble-free service over very long periods with sustained low steam consumption and with the minimum amount of attention. Compared with the conventional, directly-connected locomotive, the bearing pressures are much lower, being, for example, only 770 lb. per sq. in. of projected area for the main crankpins, whilst the main

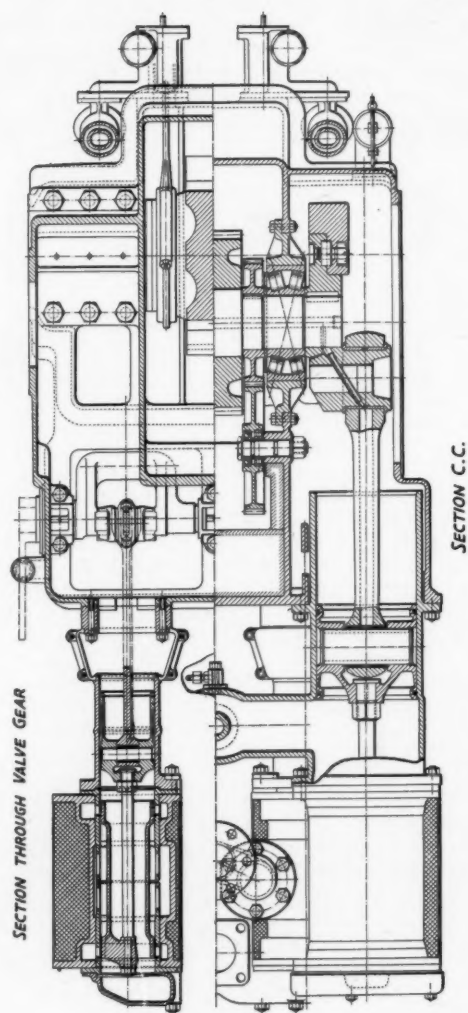
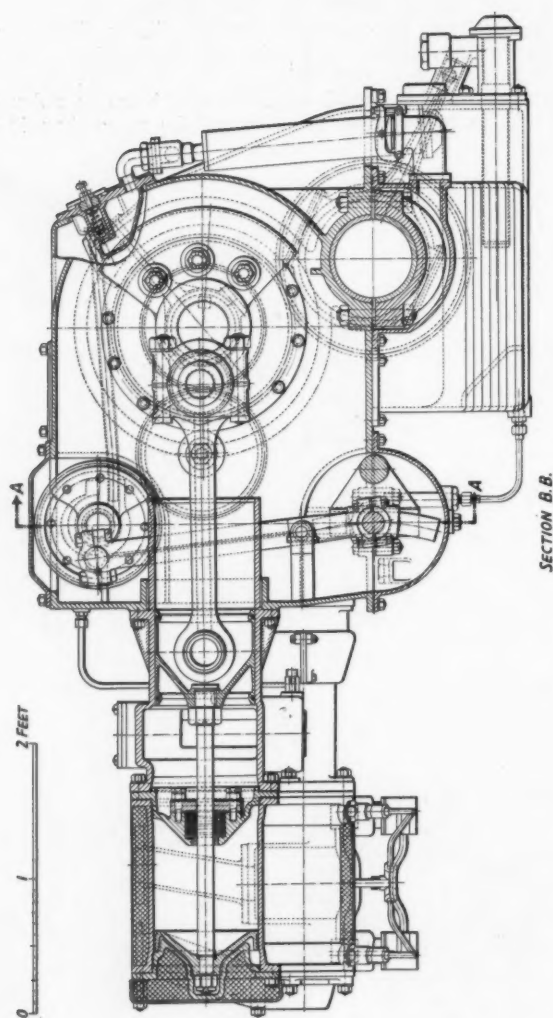
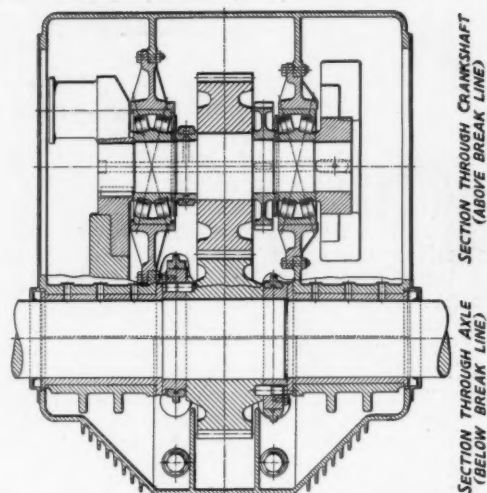
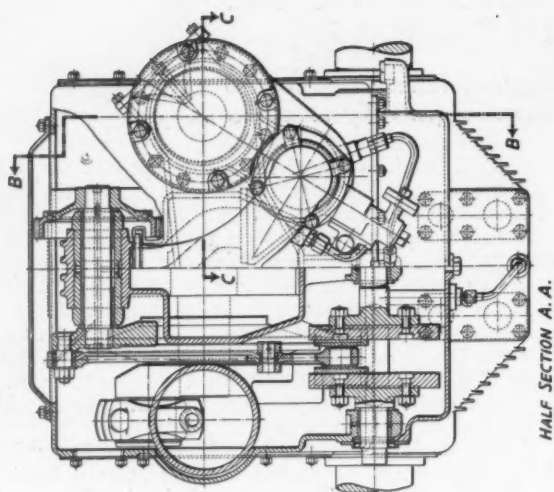
crankshaft bearings are of the roller type and very conservatively rated. The gears are mounted on the centre of the axle and engine unit, thus giving equal loading to the engine support bearings on the axle, which are of very generous proportions so that even under the worst possible combination of conditions at starting, the loading does not exceed 105 lb. per sq. in. of projected area.

The valve gear, of modified Hackworth type, is also most generously proportioned throughout, and driven by a separate crankshaft, gear-operated from the main shaft, so that there are no large eccentrics with attendant high rubbing velocity and risk of overheating.

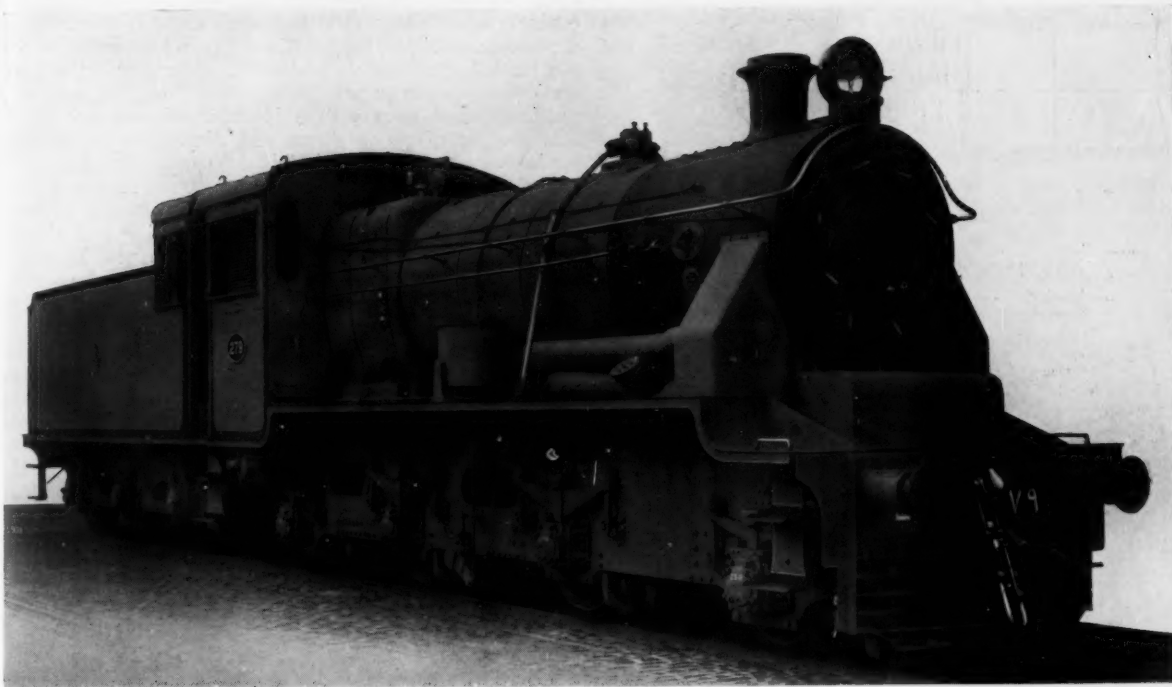
A well-designed system of forced lubrication is provided, with pressure feeds to crankpin and crosshead bearings, valve gear, crankshaft and crankpin bearings, valve spindles, crosshead pins, &c. The main gears, and also the die blocks of the valve gear, operate in an oil bath. In consequence of the low bearing pressures, adequate lubrication, and entire exclusion of dust and foreign matter by reason of the total enclosure of the engine units, the wear on the moving parts cannot be more than infinitesimal, and very substantial economies in maintenance



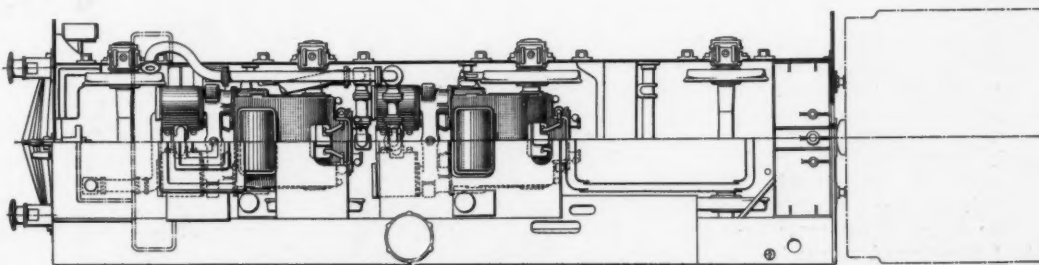
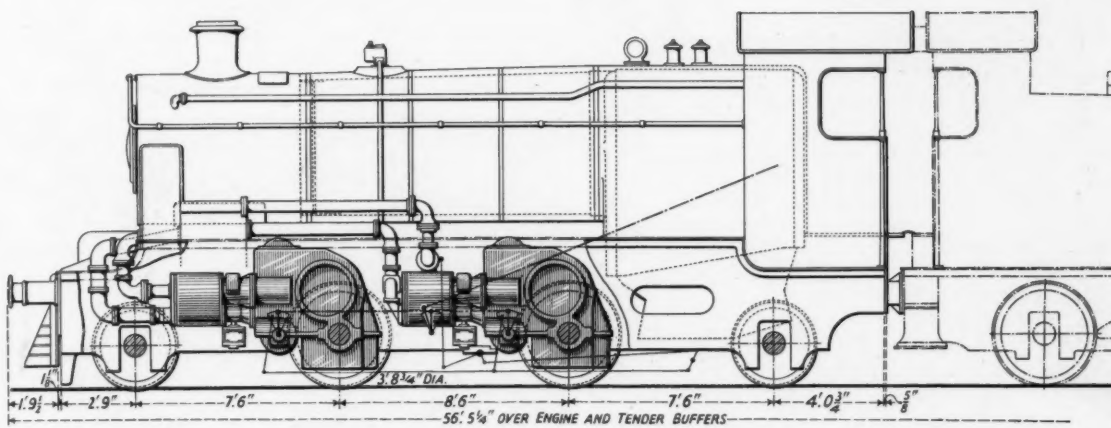
*Half front view and section through smokebox of new Sentinel geared locomotive, Egyptian State Railways*



Sections through totally-enclosed engine and geared transmission of Sentinel locomotive, Egyptian State Railways

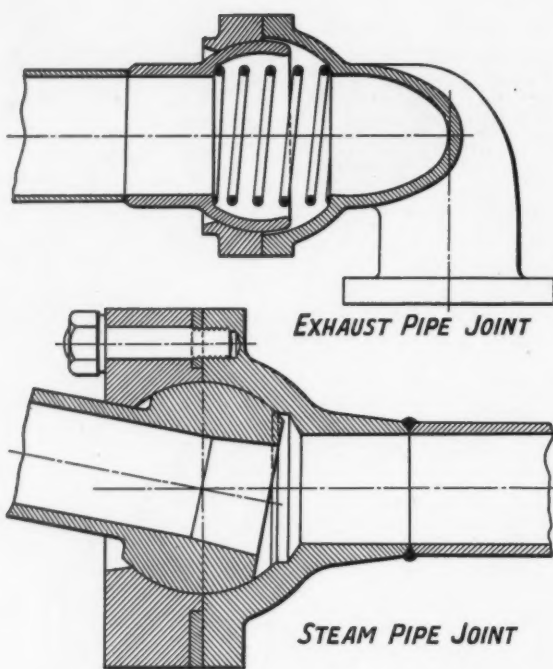


View of new Sentinel locomotive, Egyptian State Railways



Diagrams showing arrangement in elevation and plan of engines on geared Sentinel locomotive, Egyptian State Railways





*Flexible joints in steam and exhaust pipe system*

and repair costs as compared with the conventional locomotive are thereby expected. This is especially important in view of the extremely dusty conditions prevalent upon some sections of the Egyptian State Railways.

#### **Advantages of the Sentinel Type Locomotive**

For the Sentinel type of locomotive, it is claimed that appreciable economy in fuel and water consumption is assured, for the following reasons:—

**Reduced steam consumption:** Due to greater accuracy of small cylinders machined to precision limits, and reduced losses on account of higher engine revolution speed at any given piston speed and steam velocity. On actual tests, consumptions of 14-16½ lb. per b.h.p. were obtained over a wide range of speeds and cut-offs with steam temperature of 600° F.

**Reduced fuel consumption:** Due to lower steam demand and to the more favourable blast conditions occasioned by the almost continuous exhaust of the geared engines.

**Economy in maintenance costs:** A large economy in maintenance cost is effected by reason of the adoption of the enclosed engine unit in conjunction with forced lubrication as compared with the open drive of the directly connected engine. This is a most important feature, especially under the unfavourable conditions encountered on many sections of the Egyptian State Railway system.

**Improved blast conditions:** At the nominal full speed of 51·5 m.p.h., the engine units are running at 600 r.p.m., which with two engine units operating out of phase, gives 4,800 blast impulses per min. A conventional locomotive with 5-ft. 6½-in. wheels is making only 265 r.p.m. at a corresponding speed, or only 1,024 blast impulses in the same period. The effect of the more frequent and less intensive blast of the geared locomotive is to maintain a more continuous and even vacuum in the smokebox with resultant improved combustion efficiency and reduced tubeplate maintenance, thus contributing to economy in both fuel and repair costs.

**Elimination of hammer blow and steadier running:** As there are no connecting and coupling rods, and as the engine units are internally balanced, there is no necessity for balance weights in the wheels, and hammer blow on the track is practically eliminated. As a result the locomotives might be permitted to operate on lines normally restricted to engines with a lower maximum axle load. The absence of piston thrust and slidebar reactions, too, tends to steady riding at the highest speed obtainable.

Under favourable conditions, up to 40 per cent. economy in fuel consumption can be obtained with geared as compared with ordinary locomotives on shunting and similar duties. In passenger service, such as the new Egyptian locomotives are designed for, there should also be appreciable, though not of course quite such substantial, economy, and this in conjunction with the other advantages enumerated.

A particularly interesting feature of the introduction of this class of locomotive is the opportunity of direct comparison with new locomotives of the most up-to-date conventional type constructed at the same time, and as far as the boiler and running gear are concerned, in the same work. The relative performances of the four Sentinel-engined locomotives and the equivalent 4-4-0 type locomotives with Caprotti valve gear built by the North British Locomotive Co. Ltd. and described in *THE RAILWAY GAZETTE* of December 10, 1937, will furnish valuable data.

The locomotives were designed by the Sentinel Waggon Works (1936) Limited, in conjunction with the North British Locomotive Co. Ltd., of Glasgow. The engine units themselves, together with flexible pipe joints, &c., were built at the Sentinel works at Shrewsbury. The traction gears were supplied by Alfred Wiseman & Company, of Birmingham; and the boiler, frames, tenders, &c., by the North British Locomotive Co. Ltd., at whose works the erection was completed.

The general characteristics of the locomotive are shown in the accompanying drawings.



*Second class compartment in new Czechoslovak State Railways rolling stock*

## RAILWAY NEWS SECTION

### PERSONAL

Sir Herbert Ashcombe Walker, K.C.B., who retired from the general managership of the Southern Railway last October (see our issue of October 8, 1937) was unanimously elected a Director at the annual meeting of the Southern Railway Company on February 24.

Mr. J. E. Blacklin, who, as recorded in our issue of February 18, has been

Dr. Yen Te-Ching, formerly Chief Technical Expert to the Chinese Ministry of Railways, has been appointed General Manager of the Peiping-Hankow Railway.

Mr. Robert Varley, whose appointment as Acting General Manager of the Mersey Railway was recorded in our issue of February 18, received his technical education at Sheffield University. He was apprenticed to the Sheffield Corporation Electric Supply Depart-

Scientific and Industrial Research, Secretary of the Royal Society, James Forrest Lecturer for 1938.

Eng. Benjamin do Monte, Superintendent of Electrification of the Central Railway of Brazil (the first stage in the electrification of which is described in our *Electric Railway Traction Supplement* this week), entered the service of the railway in 1906, having qualified as a Civil Engineer at the Rio Polytechnic in the previous year. In 1908 he became Technical Assistant in the Sixth



Mr. J. E. Blacklin

Appointed Secretary and Accountant,  
Mersey Railway Company



Mr. Robert Varley

Appointed Acting General Manager,  
Mersey Railway



Eng. Benjamin do Monte

Superintendent of Electrification,  
Central Railway of Brazil

appointed Secretary and Accountant of the Mersey Railway Company, had three years' commercial experience before joining the Mersey Railway in June, 1907, as Clerk to the Rolling Stock Engineer. In 1910 he was transferred to the General Manager's Office, and, after serving in various capacities, was appointed Accountant in May, 1930. In October of that year he was appointed Assistant to the Secretary, in addition to his duties as Accountant, and has occupied the dual position up to his present appointment.

Mr. A. S. Quartermaine, Deputy Chief Engineer, Great Western Railway, has been elected to the Fellowship of University College, London.

From *The London Gazette* of February 25: Territorial Army, Royal Engineers, Engineer & Railway Staff Corps: Vernon Alec Murray Robertson, M.C., M.Inst.C.E., M.I.Mech.E. (late Major, Supplementary Reserve) to be Lt.-Colonel (February 26).

ment, and subsequently served as a junior engineer at the Neepsend power station of that undertaking. Mr. Varley joined the Mersey Railway in August, 1922, and served in various capacities until his appointment as Assistant to the General Manager and Engineer in May, 1934. He is an Associate Member of the Institution of Electrical Engineers, and an Associate of the Institution of Civil Engineers.

#### INSTITUTION OF CIVIL ENGINEERS

At the ordinary meeting of the institution held on February 22, the following were unanimously elected as honorary members:—

His Majesty Leopold III, K.G., King of the Belgians.

H.R.H. Gustaf Adolf, Duke of Skåne, G.C.B., G.C.V.O., Crown Prince of Sweden.

Sir Robert Elliott-Cooper, K.C.B., Senior Past-President (President of the institution, 1912-1913).

Sir Frank Smith, K.C.B., C.B.E., F.R.S., Secretary, Department of

Division, and eventually joined the administration of the railway as Assistant General Manager under Sr. Romero Zander. He has carried out a number of important works, and has served on various commissions both inside and outside the railway sphere. Other offices held by Eng. do Monte have been those of Assistant Resident Engineer; Resident Engineer; Assistant, and later Chief of Traction; and Assistant Divisional Manager. He has thus occupied all posts in the higher categories, and is now at the head of a division as Superintendent of Electrification. Eng. do Monte took part in the financial negotiations preceding the electrification, and afterwards in the detailed technical and statistical studies connected with the award of contracts.

Eng. M. T. da Silva, Technical Assistant for Electrification, Central Railway of Brazil, was a member of the commission which awarded the tenders for the scheme now being carried out, and was in charge of the

commission which visited the Metropolitan-Vickers works in England while the construction of equipment was in progress. He qualified as a Civil and Electrical Engineer in 1928.

#### INSTITUTION OF LOCOMOTIVE ENGINEERS

The following elections were made at a meeting of the institution on February 23:—

##### Members

Mr. S. Barber, Officiating Deputy Transportation Superintendent (Power), Great Indian Peninsula Railway.

Mr. N. Johnson, Locomotive & Carriage Superintendent, Burma Railways.

Mr. T. Pinder, Deputy Chief Mechanical Engineer, Madras & Southern Mahratta Railway.

Mr. W. F. Wegener, Chief Mechanical Engineer, Federated Malay States Railways.

##### Transfer from Associate Member to Member

Mr. J. R. Best, Assistant Locomotive Superintendent, Sierra Leone Railway.

##### Associate Members

Messrs. E. Amies (Heatley & Gresham Limited), O. M. Attock (English Electric Co. Ltd.), F. G. Carrier and A. H. Eddleston (L.M.S.R.), L. A. Thorman (Southern Railway), and D. M. Whitbread (L.N.E.R.).

##### Transfer from Graduate to Associate Member

Mr. E. A. Newsum (L.N.E.R.).

#### HONOUR FOR MR. R. P. BIDDLE

Mr. R. P. Biddle, Docks & Marine Manager, Southern Railway, who, as recorded in our issue of September 3, was awarded the Cross of the Legion of Honour last year, was invested with



Left to right: Mr. H. Mansbridge, Lord Radnor, Lord Ebbisham, Sir George Courthope, Mr. C. Sheath, Sir Charles Morgan, Mr. Gilbert S. Szlumper, the Chairman, Mr. R. Holland-Martin, who is seen reading his speech, and Major L. F. S. Dawes (Secretary)

#### Directors of the Southern Railway at the annual meeting

the insignia by the Comte la Combe (French Consul) on February 23. The ceremony took place at the first annual luncheon of the Southampton branch of the Association of Great Britain

and France, of which Mr. Biddle is Chairman, held at the Polygon Hotel, Southampton. The Comte la Combe said his Government appreciated all the work which Mr. Biddle had so willingly done in cementing cordial relationships between France and Great Britain, and they had been pleased to confer the only French order of knighthood—the Legion of Honour—upon him. Also, in accepting the chairmanship of the Southampton branch of the United Associations of Great Britain and France, Mr. Biddle had added his sympathy to a wide movement of understanding between free peoples.

Mr. Biddle, in expressing his thanks, said that conscious as he was of the honour done to him, he preferred to reflect upon it from a collective rather than a personal point of view. For many years he had been associated with a company which had done a great deal to develop means of transport between Great Britain and France. It had been his privilege to take a humble part in that development, and he hoped he had not neglected the opportunities that had presented themselves of cementing friendly relations.

Among others present at the ceremony were: M. de Bellefon (Consul-General and Commercial Attaché at the French Embassy), the Comtesse la Combe, the Mayor and Mayoress of Southampton (Councillor G. E. H. Prince and Mrs. Prince), and the Rt. Hon. the Earl of Radnor (of the Central Executive, United Associations of Great Britain and France.)



Mr. R. P. Biddle, Docks and Marine Manager, Southern Railway, being invested with the Cross of the Legion of Honour by the Comte la Combe (French Consul at Southampton)

Photo]

[Southern Daily Echo



## SOUTHERN OFFICERS VISIT U.S.A.

The following three Southern Railway officers sailed on the *Queen Mary* on Wednesday, on a visit to the U.S.A. :—

Mr. C. Grasemann, Public Relations and Advertising Officer.

Mr. R. M. T. Richards, Assistant Traffic Manager.

Mr. S. W. Smart, Assistant for Train Services to the Superintendent of Operation.

Mr. R. M. T. Richards, Assistant Traffic Manager, is a Member of the Co-ordinating Committee of the Associated British Railways, Inc. (whose office is under the management of Mr. C. M. Turner, 9, Rockefeller Plaza, 14 West 49th Street, New York) representing the four British group railways, and the Irish railways in the United States. Mr. Grasemann is also visiting Canada.

## SOUTHERN RAILWAY APPOINTMENTS

Mr. C. Cooper, Assistant to the Traffic Manager for Continental Traffic is retiring from the company's service on March 31. The designation of this position will then be changed to Continental Superintendent.

In connection with Mr. Cooper's retirement, the following appointments have been made :

Mr. R. H. Hacker, to be Continental Superintendent.

Mr. F. J. Wymer, to be Assistant Continental Superintendent.

Mr. S. A. Fitch, to be General Assistant to Traffic Manager.

Mr. R. F. J. Surry, to be Assistant Divisional Superintendent, London West Division.

Mr. P. A. White, to be Assistant to Divisional Superintendent, London East Division.

Mr. J. L. Harrington, to be Divisional Marine Manager, Dover.

EGYPTIAN STATE RAILWAYS  
RETIREMENTS

The contracts of the under-mentioned British officials in the service of the Egyptian State Railways have not been renewed, and these officers will be relinquishing their posts during the current year on the dates shown. The departments to which they are attached are shown in brackets :—

Mr. A. H. Allen, Divisional Inspector (Stores), May 31.

Mr. L. H. Wade, Head of Contracts Section (Stores), March 31.

Mr. P. W. Weaver, Traffic Manager (Traffic), May 31.

Mr. S. C. Foster, Divisional Traffic Superintendent (Traffic), May 31.

Mr. H. A. K. Barker, Divisional Traffic Superintendent (Traffic), March 31.

Mr. J. E. W. Boyes, Assistant Chief Engineer (Engineering), April 30.

Mr. A. Darmina, Technical Assistant (Loco.), May 31.

Mr. A. Galley, Shift Engineer (Loco.), June 30.

Mr. R. R. Stephens, Assistant Divisional Superintendent (Loco.), August 29.

Mr. R. A. Holt, Chief Shop Foreman (Loco.), November 5.

Mr. R. E. Anderson, Divisional Superintendent (Loco.), December 10.

Mr. E. G. A. Finch, Locomotive Inspector (Loco.), December 31.

Mr. R. B. Johnstone, Assistant Superintendent of Press, II (Audit), May 31.

Mr. James Addie, Assistant Chief Engineer (Engineering), May 31.

Mr. L. J. Shildon, Electrical Engineer (Mechanical), November 16.

Mr. S. Gridley, Boiler Inspector (Mechanical), December 20.

Capt. D. McNaught, Assistant Auditor, II (Audit), May 31.

Mr. G. H. Stopford, Superintendent of Signalling (Engineering, resigned), May 31.

Mr. H. N. Bassett, Chief Chemist (Loco., resigned), March 1.

The London & North Eastern Railway announces that the following appointment has been made :—

Mr. H. T. Bird, Chief Assistant to the District Engineer, Leeds, to be Assistant District Engineer, King's Cross.

Lt.-Colonel F. A. Cortez Leigh, who from 1923-34 was Electrical Engineer of the London Midland & Scottish Railway, has joined the board of John Ismay & Sons Ltd., manufacturer of electric lamps and other equipment.

We regret to record the death on February 18, at the age of 82, of M. Edouard Anseele, a leader of the Belgian Socialist party, who was Minister of Public Works in 1923 and became Minister of Railways in 1925.

NORTHERN IRELAND TRANSPORT  
COMMISSION

Viscount Craigavon, Prime Minister of Northern Ireland, has now made the appointments to the Northern Ireland Transport Commission, the formation of which to investigate the operation of the Road and Railway Transport Act was announced in our issue of February 18. The appointments are as follow.

Sir William M'Lintock, Bart., C.B.E., C.V.O. (Chairman). Sir William is Senior Partner of Messrs. Thomson, M'Lintock & Co., Chartered Accountants. He has served on many Royal Commissions, and was the accountant mainly responsible for the winding-up of the various companies in the Royal Mail group.

Sir Herbert A. Walker, K.C.B., formerly General Manager, and now a Director, of the Southern Railway (Member).

Mr. J. S. Nichol, Managing Director of McNamara & Co. Ltd. (Member).

Mr. R. Simpson, of Messrs. Thomson, M'Lintock & Co., and Mr. E. Seales, of the Northern Ireland Ministry of Home Affairs, will act as Secretaries.

## Forthcoming Events

Mar. 4 (Fri.).—Institute of Transport (London), at Connaught Rooms, Great Queen Street, W.C.2, 7 for 7.30 p.m. Annual Dinner.

Institute of Transport (Nottingham Graduate), at Guildhall, 7 p.m. "The Travel Agent," by Mr. G. Sweet.

Omnibus Society, at Inst. of Marine Engineers, The Minories, London, E.C.3, 7 p.m. "Long Distance Coach Operation," by Mr. L. Nicholson.

Mar. 5 (Sat.).—Permanent Way Institution (Manchester-Liverpool), at Technical College, Liverpool, 3 p.m. "Permanent Way for High Speed," by Mr. W. A. Willox.

Mar. 7 (Mon.).—Engineers' German Circle, at Inst. of Mechanical Engineers, Storey's Gate, London, S.W.1, 6 p.m. "Freikolben Maschinen (Free-Piston Engines)," by Mr. H. Trost.

Permanent Way Institution (London), at Underground Railways Dining Club, Pelham Street, S.W.7, 7 p.m. "Permanent Way for High Speed," by Mr. W. A. Willox.

Stephenson Locomotive Society (Scottish), at Royal Technical College, George Street, Glasgow, 7.30 p.m. "Thirty Years of English Locomotive Development," by Mr. R. Weight.

Mar. 8 (Tues.).—Institute of Transport (Birmingham), at Queen's Hotel, 6 p.m. "The Development of Transport," by Mr. W. Creighton.

Institution of Civil Engineers, Great George Street, London, S.W.1, 6 p.m. "Engineering Problems Associated with Clay, with Special Reference to Clay Slips," by Mr. T. Seaton.

Permanent Way Institution (Sheffield), Annual Dinner.

Permanent Way Institution (York), at Railway Inst., Queen Street, 6.30 p.m. "Curves, Adjusting and Maintaining Alignment and Superelevation," by Mr. W. Dunstan.

Mar. 8-10.—Institute of Metals, at Inst. of Mechanical Engineers, Storey's Gate, London, S.W.1, 7 p.m. Annual General Meeting.

Mar. 9 (Wed.).—Institute of Metals, at Grosvenor House, Park Lane, London, W.1, 7 p.m. Annual Dinner.

Institute of Transport (Manchester-Liverpool Graduate), at Exchange Station Hotel, Liverpool, 6.30 p.m. "Preparation for the Institute Examinations," by Mr. F. Watts.

Institute of Welding (Tees-Side), at Cleveland Scientific Inst., Corporation Road, Middlesbrough, 7.30 p.m. "Metallurgical Aspects of the Welding of High Tensile Steels," by Mr. L. Reeve.

Mar. 10 (Thurs.).—Diesel Engine Users' Association, at Caxton Hall, Caxton Street, London, S.W.1, 5 p.m. "Bearing Metals."

Institute of Welding (Leeds), at Griffin Hotel, 7.30 p.m. "Spot, Butt, and Resistance Welding," by Mr. P. Dunn.

Institute of Welding (Liverpool), at City Technical College, Byrom Street, 7.30 p.m. "Metallurgy of Welding," by Mr. H. Harris.

Institution of Electrical Engineers, Savoy Place, London, W.C.2, 6 p.m. "The Lighting Load: Its Characteristics and Development," by Mr. W. Jones.

Railway Club, at Royal Scottish Corporation Hall, Fetter Lane, London, E.C.4, 7.30 p.m. "High Speed Extra-Fare Express Trains. Do they meet the Needs of the Public?" by Mr. H. Vallance.

Mar. 11 (Fri.).—Institute of Transport (Newcastle), at Royal Station Hotel, 7.30 p.m. "Incentives to Transport Employees," by Mr. D. Lamb.

Institute of Transport (Newcastle Graduate), at Royal Station Hotel, 6 p.m. "Internal City Transport," by Mr. E. Bond.

Institute of Welding (Midlands), at James Watt Inst., Newhall Street, Birmingham, 7.30 p.m. "Electric Arc Welding of Stainless Steel," by Mr. V. Pearson.

Institute of Welding (South Wales), at Technical College, Swansea, 7.30 p.m. "The Testing of Welds," by Mr. R. Smallman-Tew.

Mar. 12 (Sat.).—Stephenson Locomotive Society (Midlands-Northern), at 4, Bury Old Road, Manchester, 6.30 p.m. "Transport and Industry in South Wales," by Mr. S. Beaver.

## SOUTHERN RAILWAY COMPANY

*Higher gross receipts—Further passenger increase—Train ferry results—  
—Electrification policy explained—Waterloo & City improvements—  
Southampton Docks centenary—Southern Sales League—Rebuilding stations*

The annual general meeting of the Southern Railway Company was held at Southern House, Cannon Street station, London, E.C., on February 24, Mr. Robert Holland-Martin, Chairman of the company, presiding.

The Secretary (Major L. F. S. Dawes) read the notice convening the meeting.

The Chairman: My Lords, Ladies and Gentlemen, I told you at the close of my speech last year that, helped by a team of officers and men unequalled in the country, able, keen, hardworking and ready to undertake at all hours anything to the advantage of our line, I looked forward to placing before you an even better statement of progress than for the year 1936. My team, aided by the events of the year, have not disappointed me and I am certain that you too feel gratified by the results obtained in 1937.

But as is the case with all teams, some cannot help growing old and have to pass to retirement. For that reason you no longer see beside me Sir Herbert Walker who has so long captained our side with such skill, energy and forethought and has brought through to fruition our great docks at Southampton and a very substantial part of our great scheme for suburban electrification. His has been a wonderful achievement, and today, as you know, I shall be asking you to elect him to our board that we may still benefit by his knowledge and wise advice. In his place you see by me Mr. Gilbert Szlumper who has been Assistant Manager to Sir Herbert Walker for many years. He, we feel confident, is at the beginning of a most successful term as General Manager, and we are proud that he is indeed a product of this railway. His father, I need hardly remind you, was Chief Engineer to the L. & S.W.R. and to this company, and he himself, besides holding other posts, was our Docks Manager at Southampton.

You will also miss from his long accustomed place at this meeting Mr. William Bishop our Solicitor for 28 years out of a total railway service of no less than 53 years. His geniality, wisdom, courtesy and kindness made him a personal friend of all who worked with him. In his place we have appointed Mr. Smedley, an officer with us of long standing and great skill in legal and Parliamentary affairs. We have lost, too, our valued Chief Mechanical Engineer Mr. R. E. L. Maunsell, who has been responsible for many engines and coaches of fine design. In his place we have appointed Mr. O. V. Bulleid who was formerly Assistant to Sir Nigel Gresley of the L.N.E.R.

And in addition to the passing out from service of these officers you will have noticed that one of my senior colleagues, Mr. Dudley Docker—he was appointed a Director of the L.B. & S.C.R. seventeen years ago in 1921—has decided not to seek re-election as he finds that it is difficult for him to fit in this work with his other activities. We regret that we shall no longer have the call on his great knowledge and mature advice.

I am sorry to have to tell you that during the past year we have lost by death no less than two of our auditors. Mr. Pelham Ford, who succeeded his father Mr. James Ford as Auditor in 1932, died in September—his father was an Auditor of the Southern and Brighton Companies for nearly forty years—and Sir Albert Wyon, who had acted since 1918 as Auditor of the S.E.R. Company and was appointed one of our auditors on the amalgamation, died in December. We shall greatly miss their wise criticisms and tender our deepest sympathy to their families and firms.

Later, a shareholder will propose that our remaining Auditor, Sir Harry Peat, whose term of office expires this year, shall be re-elected, and that as second Auditor Sir Nicholas Waterhouse, a partner of Sir Albert Wyon, who

under the authority of the Minister of Transport has been acting as Auditor in place of Sir Albert Wyon, shall be elected in his stead.

Now I will turn to the report and accounts. I assume that I may take them as read. Before quickly running through the accounts I should like those of you who have the full accounts in front of you to notice that this year we have omitted the shillings and pence from all the financial tables. This alteration has been approved for all railways by the Ministry of Transport, and I think you will agree with me that it makes the accounts much easier to study.

### Capital Expenditure

Turning to page 4, No. 4, Receipts and Expenditure on Capital Account, we have raised no extra capital, but our capital account has now become overspent by £2,351,000 more (the details of which I will give you later), making a total debit of £10,718,000. Under existing powers we are enabled to raise £14,854,000 more capital, which leaves us £4,136,000 against our present estimate for further expenditure of £3,370,000. We do not, however, propose to issue any new capital for the present as we still have money available from the Railway Finance Corporation, from whom we took another 1½ millions last year, leaving a balance still at our disposal with the corporation of £3,429,811. The expenditure during the year on capital account amounts to £2,351,000, which has been spent mainly as follows:—

Electrification ...	972,000
(This covers the finishing off of Portsmouth No. 1, the starting of Portsmouth No. 2 and the Ascot to Reading line).	
Additions and improvements to stations, &c. ...	190,000
(Including Bournemouth Central, Bricklayers' Arms, Havant, Portsmouth Harbour, Richmond, Surbiton, and Woking, &c.)	
Rolling stock ...	1,053,000
(Comprising stock for Portsmouth Nos. 1 and 2, and other schemes.)	
New line, Motspur Park to Leatherhead ...	90,000
(We hope to open this as far as Tolworth early in the summer, and we have put the next section through to Chessington Grange in hand.)	

### A Million Passengers a Day

Now turn to page 6, Table 8, the Revenue Receipts and Expenditure of the whole undertaking. The total gross receipts were up by £1,313,000, of which the increases in purely railway receipts were as follows:—

£830,000 passenger traffic,
£11,000 goods traffic,
£16,000 miscellaneous,

i.e., an increase of £857,000 or just over 4 per cent., making the total gross receipts from railway working £22,113,000.

Now as to how this has been achieved. We have carried in the past year more than a million passengers a day. The total number of passenger journeys, including season-ticket holders' journeys, in 1937 was 378,714,000, an increase over 1936 of 18,452,000 (5.12 per cent.). Of this addition about 15½ millions (5.6 per cent.), including 6 million season-ticket holders' journeys, was due to journeys made in the electrified area.

You will remember that last year we were pleased with our increase of eleven million passengers; we have now got this further great increase of eighteen million passengers over that figure, despite our lacking the extra day leap year gave us in 1936, and we shall be disappointed if we do not see some further growth this year. We must not forget, however, that the year 1937 was in many respects an abnormal one, as England, and particularly London, became very full during the Coronation period and there were a

great many people on the move. We were also helped by the strike of the London busmen from April 30 to May 27 last, which naturally gave us more passengers to carry by rail. I am glad to say that many of these passengers have recognised that the rail has less delays than the road and now make their journeys by our suburban service.

### Continental Traffic Increase

Now I am going to tell you a little about our Continental traffic, and I have some cheering figures for you. Mainly owing to the fall of the French franc, there has been a large traffic increase in our Continental services, particularly those to France, which you will realise are more advantageous to us than the Belgian route, on which we do not own the steamers. We have had an outstanding year of Continental traffic. Of course, the Coronation brought many visitors from the Continent, but even allowing for this, I think we can be more than satisfied with our figures. I shall talk about the details of Continental traffic later, but the number of passengers carried by the railway in connection with this traffic (excluding Channel Islands traffic) increased by 468,000, bringing in nearly £248,000 more under the head of railway working than last year.

You will see from Table 10 on page 7 that we have earned £58,000 more from parcels and other merchandise by passenger train, an increase to which the Continental traffic materially contributed.

Let me now turn to goods: Under the heading Goods Train Traffic there has been a small improvement of £12,000. We are £68,000 up on general merchandise, again largely due to Continental traffic, also to our home traffics in cement, iron, steel, paper, &c., but we are £57,000 down on minerals and merchandise, a heading that covers mainly bricks, sand, gravel, &c., and the decrease is due to a slowing down in the building trade in our area: £7,000 up on coal and coke, due to increased through traffic from other railways (the total increase would have been much greater but for a big falling off of Kent coal traffic due to various internal causes—I am glad to say, however, that there seems now to be an improvement here); £6,000 down on livestock, due almost entirely to the severe outbreaks of foot and mouth disease in the southern counties served by your line.

The net receipts from railway working are £88,000 more than they were last year; the remaining net receipts after deducting miscellaneous charges have gone up by £238,000, the principal rises being: Steamboats £236,000; Docks, Harbours and Wharves £22,000; this gives us a total increase in net revenue of £326,000, i.e., from £6,226,000 to £6,552,000.

### The Channel Train Ferry

I should like here to review the working of the first whole year of our train ferry from Dover to Dunkerque. As you know it was opened only in October, 1936, so that I was unable to give you many details last year. Now, however, we have a whole year's working on which to base our deductions. On this mixed passenger and goods train ferry service between England and the Continent no fewer than 74,000 passengers were conveyed, approximately one half occupying the special sleeping cars. Of these sleeping car passengers, 18,000 were first and 19,000 second class passengers. It is also interesting to note that 54 per cent. of the sleeping car passengers were non-British.

The ferry motorcar service which commenced only on the completion of the inclined carriage way at Dover in June, 1937, was satisfactory, 1,600 cars being conveyed. You will remember that every car that goes on board or comes off at Dover and Dunkerque does so under its own power, no cranes being used to lift the cars, which are run off without delay on the arrival of the boat. It is anticipated that in 1938 the ferries will carry motorcars to capacity during the season.

With regard to freight traffic, some 60,000 tons were conveyed by the ferries, but you must bear in mind that this is not all new traffic, for some proportion of it would no doubt have come to us by other routes. The ferry receipts for the year, spread over boat and rail, were approximately

£220,000. Whenever politics in Southern Europe become more stable we hope to secure a large traffic in the carriage of oranges, lemons and other fruit native to those sunny countries.

### A Word of Caution

I must refer for a moment to our steamboat account as a whole. This is where the growth of the Continental traffic is mainly reflected, and you will see that our gross receipts from steamboats rose from £1,125,000 to £1,465,000, an increase of £340,000. This greater earning was accompanied by a rise of only £104,000 in expenditure, leaving a net receipt of £236,000 more than for last year.

I want our shareholders to realise that our steamboats traffic is our principal ancillary business and has a great bearing on our final results. This traffic, as you have heard, increased exceptionally last year, especially during the last half of the year, and has made a great difference to our prosperity and exceeded all our expectations, but you must remember that, of all our sources of revenue, it is the most dependent on the international situation, both political and financial, and shareholders must always bear in mind that any change of conditions on the Continent may very quickly bring down our receipts from this traffic.

### The Weekly Traffic Figures

Some critics have commented on the wide difference between the actual increase in our gross receipts for the year and the increase for 52 weeks as published in the weekly traffic returns. These returns gave an estimated increase of £731,000, whereas the actual rise in our gross receipts from all businesses for the year was £1,313,000.

As some misapprehension still appears to exist on this subject let me repeat that the weekly traffic figures relate to passenger and goods train receipts on the railway only. They do not include receipts from cloakrooms, platform tickets, and so on, and, what is more important in the case of the Southern Railway, they do not relate to receipts from steamboats, docks, hotels and other businesses.

Our railway train receipts were up by £841,000 compared with an estimate of £731,000 for 52 weeks as published in the weekly return—quite a close estimate when you remember that our total traffic receipts are over £22,000,000. Our gross receipts from our ancillary businesses (mainly derived from steamboats) gave us an increase of £472,000, and this of course was not reflected in the weekly railway traffic figures.

You will have learnt from our report that in June we seized a favourable opportunity to sell the South Eastern Hotel, Deal. This hotel had shown a loss for some time; in fact, ever since the war, and we had been awaiting a chance to get rid of the liability. We now have under our direct management only the Charing Cross Hotel and its neighbour the Craven, and I would draw your attention to the facilities which they provide for the City man, who, coming up from the country or suburbs and wishing to stay late in town to entertain his wife and friends, can have his luggage sent from any of our termini to the hotel, can change there, dine, go to the theatre, and send his luggage to await him in the cloakroom at his departure station. There is an increase in net receipts of nearly £9,000 on hotels.

### Air Transport Policy

In regard to air transport the loss was £5,000, practically the same as the previous year. Our policy now is to curtail our operations in connection with the air, as we feel that, having been interested since 1934, we have obtained sufficient experience for the time being for us to use when needed, and we do not want to keep on spending any appreciable amount of money over this form of transport, though we do not consider the money spent by any means lost.

This brings me to the proposed Lullingstone aerodrome: in view of the rapid development of building in the neighbourhood of London and in the realisation that this development would soon render impossible the establishment of a new international airport within the Metropolitan area, we purchased an option on a site at Lullingstone (near Swanley Junction) which we were advised by experts offered



peculiar advantages for aerodrome purposes, such as immunity from fog, and, most important to us, accessibility from our railway. Though we possess the necessary powers to do so we do not feel that it is for us as a railway to develop this site as an aerodrome. We have, nevertheless, ascertained the cost of levelling the ground and making the necessary rail connections to an underground airport station in the centre of the aerodrome. We are of opinion that an airport of international importance so close to the capital of the Empire is not a matter for private enterprise, but that the cost of providing it should be met like the roads, in part by the State and in part by county authorities. In no case can an airport under present conditions earn a fair return on the necessary foundation and equipment expenditure.

Net miscellaneous receipts, from which we draw no less than £1,237,000, were down by £6,000. Under this heading rents from houses and land went up by £16,000, a very satisfactory result upon which our Estate Agent must be congratulated; Rents from hotels were up by £4,000 and other rents up by £12,000; General interest and interest from investments in other undertakings, though it included an increased revenue from Hay's Wharf Cartage Company and our bus companies, were down by £23,000.

The grants received from the Treasury in respect of Southampton Docks were down by £15,000; this subsidy, as you know, decreases annually. The interest on our growing superannuation funds, which now stand at £5,584,000, cost us £218,000, an increase of £7,000.

#### Reserve Funds

You will have noticed in the report that we have transferred £400,000 from the improvements and contingency fund to the rolling stock renewal fund, which needed strengthening, and, further, because the essence of good finance is to build up strong reserve funds, we have, in view of the rise in costs, made an extra provision of 10 per cent. in the allocations we have made to all our principal reserve funds.

Then instead of continuing to carry our fire insurance ourselves we have placed the major portion elsewhere. We have therefore transferred £500,000 from the Fire Insurance Fund to the Improvements and Contingency Fund, leaving £140,000 in the Fire Insurance Fund to cover the risks still carried by ourselves.

Our reserves are therefore in a healthy state to meet the extra cost of materials, and I hope that this fact will have its influence on future dividends on our deferred stock, which it is our desire to maintain at a steady level with, let us hope, occasional movements in one direction only—upwards.

After making these provisions we are left with the increased revenue of £326,000, and are able to recommend to you, after payment in full on our other stocks, not the dividend of  $\frac{1}{2}$  per cent. with which we resumed payments on the deferred stock last year, but a dividend of  $\frac{1}{2}$  per cent., a decided improvement, which I hope you will regard as satisfactory. And having paid that we place the balance of £6,000 to our carry forward.

Having dealt with the accounts I will now give you some more information on the various events that have had special incidence on the working of the railway during the past year.

#### Rising Costs

In July, 1937, the three railway unions submitted to the Railway Staff National Tribunal claims for reduced hours and increased rates of pay, including the restoration of the remaining  $1\frac{1}{2}$  per cent. deduction and the standard rate of pay for night duty and Sunday duty, which had been reduced in April, 1931. The tribunal restored the standard rates, and also granted some wage increases to the lower paid employees, a decision which was accepted by the railway companies and the trades unions.

The additional annual cost to this railway of these and other concessions granted last year is £700,000, an average of 4s. a week to each employee, but you will of course realise that the full incidence of this has not fallen on the year under review.

I should like to say a few words about the 5 per cent. increase in rates and charges. I can assure our passengers and traders, who found this increase irksome when it was first imposed, that we waited as long as possible before we applied to the Railway Rates Tribunal. But we could not ignore, in the interest of our shareholders, the incidence of the increased wages, the restoration of the cuts, and also higher cost of materials—so, in common with the other companies, we felt that it was absolutely necessary to ask for the 5 per cent. increase. This is not very great on a small fare such as London to Aldershot third class monthly return, which has been increased from 6s. to 6s. 4d., or the rate on a ton of vegetables from Nine Elms to Aldershot which has been increased from 7s. 3d. to 7s. 7d.

The tribunal did not hesitate to give us authority to make the increase as from October 1, and I feel that now that we have got it we shall have some chance during the coming year of retaining the gains we have already made and be able to apply them to consolidating our financial position. As you all know a very large proportion of our passenger traffic falls within the London Passenger Transport area, within which the fares have not been increased, so that a considerable number of our passengers are not affected.

#### The Electrification Programme

Now as to our electrification programme. You will see from the report that full electric services on the direct Portsmouth line were begun in July last, and that similar services will start next July to Portsmouth Harbour *via* Chichester, serving Bognor and Littlehampton; an electric service will also operate between Brighton and Portsmouth. Other electric schemes in hand include the railway from Virginia Water to Reading *via* Ascot, from Ascot to Ash Vale junction, from Frimley to Pirbright junction and from Aldershot North junction to Guildford. Work has also been started on the electrification of the lines from Gravesend Central to Maidstone West, Swanley Junction to Gillingham, Strood to Rochester and Otford to Maidstone East.

With regard to our project for giving Hastings and Bexhill a second electric route, by the electrification of the line from Sevenoaks to Hastings *via* Tunbridge Wells, we have decided after most careful consideration not to proceed with this scheme at the present time. This particular project was always the least financially attractive of our various electrification proposals, owing in great measure to the restricted gauge of some of the tunnels on that section of the line, which would involve large expenditure in the building of special stock to pass through them, or the enlarging of the bore of the tunnels themselves. The recent rise, too, in the cost of materials and labour made it even less attractive. In coming to our decision we had also in mind the fact that Hastings is already well served by electric trains by one route, that is *via* Lewes, so that the small improvement possible in the time of trains on the No. 2 route would probably mainly result in transferring many passengers from No. 1 route to No. 2 route at little gain in time to themselves and at considerable cost to our shareholders.

A few days ago we met a deputation from Hastings and Bexhill, consisting of the Mayors and Town Clerks and other civic representatives of both towns, and personally told them of the decision that we had reluctantly been forced to take. We have every sympathy with the towns concerned, but I am sure you will agree that we have acted in your interests.

Speaking of our schemes for electrification, a subject to which I devoted a good deal of my speech last year—the alleged dangers of the third-rail system of electrification—I am glad to be able to tell you that increased electrification did not bring with it a corresponding increase in the number of accidents last year, and that as a further precaution against danger we are putting up wire mesh fencing in places held to be specially liable to trespass by children and where frequent crossings are made by hunts and others. I would again remind you that wherever there is any considerable use made by persons or animals of any ungated level crossing, a grid that deters all hoofed animals is placed on either side of the crossing, and that at no level crossing does

the third rail have to be crossed, for a gap is made in its continuity.

### Southern Sales League

With a view to stimulating interest among the traffic staff a scheme known as the Southern Sales League has been in operation since January 1 this year. The object of the scheme is to encourage the staff to secure increased passenger and goods revenue for the company. The receipts taken at every station on the line for several years past have been carefully studied, and a calculation made, based on those figures and weighted by the increase of population and other factors, as to the amount that should be earned this year (1938) by each individual station. This figure of prospective revenue to be earned has been sent to each station, together with a sheet showing that figure and last year's receipts, month by month, with spaces for this year's figures. This form, framed, is kept in view of the staff at every station. The stations have been formed into leagues, in accordance with the volume of traffic dealt with, and silver cups and shields will be competed for annually in each league. The cups and shields will be held by the winning stations for twelve months, and replicas will be distributed to the winners for permanent possession. In addition, cash prizes will be awarded annually for the best individual sales efforts during the year by members of the traffic staff in each of the leagues. A publication known as *Southern Sales* is issued to each member of the staff monthly, showing the progress of the leagues and calling special attention to various sales features. It is hoped that in this way an increasing amount of new business will be secured by our staff, helped, I hope, by the co-operation of our shareholders, who can themselves do much to help. The first month's working of this scheme has come well up to our expectations.

Another innovation is being tried by which it is hoped to secure the co-operation of the staff in handling all goods in the most skilful and careful manner, thus decreasing the claims for breakages and other damage by water or rough handling. This will consist of a van fitted as a travelling cinema in which will be displayed films showing how best to handle goods and how not to handle them.

### The Waterloo & City Tube

You probably read in the press a few weeks ago severe criticism of the Waterloo & City Railway. We have long been conscious of the shortcomings of this important link in our system and readily met a deputation of regular travellers on this line at Waterloo. We were glad to be able to show them that delay in improvements had not been due to lack of sympathy with their real grievances or to cussedness on our part, for there were very serious difficulties to be contended with, and to relieve their minds that we were at last in a position to do something. We have already sanctioned the following improvements.

The construction of new rolling stock which will practically double the present carrying capacity. This will be designed to have more accommodation and larger doors, and should eliminate queues.

Renewal of signalling arrangements, cables, &c., and the placing of the conductor rail in a new position, all of which will also add their quotas, even if small ones, to the capacity of the line.

Certain smaller improvements tending to greater comfort, such as welding of rail joints, noise-absorbing shields, &c.

Arrangements for issue and collection of tickets at terminal points instead of in trains.

So far as the Bank station is concerned, we have to fit our plan in with the L.P.T.B. We have the board's proposals, which we are examining. We hope soon to be in a position to fit in our schemes for relieving that horrible—I speak as one who uses it sometimes two or more times a day—inclined way at the Bank by an escalator up to the level of the present Bank station if that station is to be left as it now is, or with any improvement the London Passenger Transport Board may propose to make.

### Coronation Traffic

I have referred to the effect of the Coronation on our revenue, and think you may now be interested to have a few particulars of the traffic which it brought to us and of the steps we took to deal with that traffic. In addition to the large contingents of naval and military forces which had

to be conveyed from Chatham, Portsmouth, Aldershot, Shorncliffe, and other centres to London and back, no less than 51 foreign delegations arrived and left by our railway (many of them by special trains), numerous special trains had to be run to carry the sightseers who came up to the early morning rehearsals of the ceremonies or to watch the illuminations, while on Coronation day itself a 24-hour service of trains was maintained from 3.0 o'clock in the morning. By 7.0 a.m. on that day we had run 310 special trains and something like a quarter of a million passengers had been brought by us to London, nearly all of whom had to be taken home again. The busmen, you will remember, were on strike then.

In connection with the Coronation Naval Review at Spithead on May 20, a special royal train conveyed Their Majesties to and from Portsmouth, and 63 special trains, carrying some 20,000 passengers, were run by us between London and Southampton and Portsmouth, and 21 of our vessels were utilised for watching the review. All this work was carried out without hitch or accident of any kind, and I need not tell you that it entailed an enormous amount of organisation and responsibility on our staff, to whom I know you will wish to offer your congratulations and thanks for the splendid way in which they organised and carried out this huge movement.

### Southampton Development

At Southampton I can report progress in the letting of sites for factories on our large estate of reclaimed land. Sites have been let to Heinz, and Cadbury Bros., and General Motors Limited, the great American combine, have taken an area of six acres to establish a factory for the assembling of motorcar parts which will come from overseas. This great factory should bring a large increase of trade to Southampton, and auxiliary factories will, we hope, follow. A new road serving the reclaimed area has been opened, and two model factories have been erected by us to show what accommodation can be given to firms requiring new works.

Our policy at Southampton is to keep the standard of factories on our reclaimed area as high as we can. We like big firms and big factories if possible, as these should bring subsidiaries in their wake, and we are actively engaged in letting the world know what excellent sites are obtainable with access by rail, sea, and road. In this connection we are shortly sending an officer to America to report on the desirability of representation in Canada and the United States in connection with Southampton Docks, and freights generally.

On October 12 this year Southampton Docks will celebrate its centenary, work having been commenced by the Southampton Docks Company on October 12, 1838. The former S.W. Company took over the docks in 1892, from which time they have grown in size and importance until they form now, as you know, one of the most famous and best equipped shipping centres in the world.

### Air Raid Precautions

We have lately taken in hand the subject of air raid precautions, and are busy examining what may be necessary to bring us into line with what is being done elsewhere in the country; we have close liaison on the subject with the Home Office.

You will, I know, approve of our having taken some part in the patriotic work of the Territorial Army. We have raised, with the enthusiastic approval of the War Office, a company to form part of one of the searchlight battalions entrusted with the anti-aircraft defence of London, and this company is, as far as possible, to be made up from personnel of the Southern Railway, both officers and men, who could be spared for such duties in war time.

Returning to the working of our railway during the past year I have, alas, to record two very serious accidents, one at Battersea, where ten people lost their lives and many were injured, and the other at Swanley Junction, where four persons were killed and several injured, and I take this opportunity again to express our sympathy with the bereaved relatives and friends. Both accidents, as you will have seen from the Ministry of Transport reports, were

due to the human element that it seems impossible to eradicate altogether. We take every possible care, but it is impossible to prevent all mistakes occurring; nor can mechanical appliances entirely take the place of man. One of the great aids in the prevention of accidents and the speeding up of working is colour-light signalling. By its use the driver is able clearly to distinguish his signals and to proceed confidently even in fog. We are increasing our installation of this system, and passengers may feel confident that in all ways we are continually doing our best to improve the safety and the working of your line.

#### Station Improvements

We are spending much money in improving our stations, which you all will realise are the gathering ground of our passengers, who cannot be expected to enjoy their journeys if having left their cosy firesides they are frozen, rained on, and chilled on our platforms. In our new stations, such as Surbiton and Richmond, we have endeavoured to provide cheerful, clean, business-like structures capable of dealing expeditiously with our ever increasing traffic with comfort to the passenger, for we find that improved stations bring increased revenue. We are well on the way with the work of remodelling Woking, Templecombe, Swanage, and other stations. Twickenham station is shortly to be reconstructed, as are Horsham, Littlehampton, and Chichester. Our goods stations have been improved. A new four storey general warehouse for general traffic and a single storey warehouse for the large Kraft and newspaper traffic at Bricklayers' Arms have taken the place of the sheds burnt down in the previous year. Work is actively in progress on the new railway from Motspur Park to Tolworth and Chessington, a portion of which will be opened for traffic this summer.

It is our constant endeavour to make the Southern Railway as comfortable and efficient as any line in the world, but before initiating any improvement we consider most carefully how the capital cost of that improvement can be made productive. In such a way we hope to be able to present year by year a story of physical and financial progress based on conservative finance, and, having set such a course, we look forward with confidence to the future.

I beg to move:—

"That the report of the directors and the statement of accounts for the year 1937 be and the same are hereby received and adopted.

The Deputy Chairman: I have much pleasure in seconding that.

#### Shareholders' Remarks

Mr. K. D. Hunter introduced his remarks with a congratulatory reference to the Chairman's speech and to the satisfactory results produced during the past year, sentiments which were echoed by most of the subsequent speakers. He doubted whether the company had ever before been able to point to a net revenue as high as £6½ million, or that the balance sheet had ever been in so strong a position. In his opinion the progressive policy of the directors in regard to electrification was largely responsible for the payment of 1½ per cent. to the deferred shareholders. He asked whether the Chairman could say to what extent the Coronation had influenced the increased traffic, and he asked for further information as to the Chairman's statement, in dealing with traffic in the London area, that the London Passenger Transport Board had not yet increased its fares.

Mr. L. H. Beacher Shand asked for cheap travel facilities to Hassocks and Hayward's Heath on the same basis as those granted to Brighton. Mr. Headley drew attention to what he regarded as the dangerous conditions under which passengers had to make their way from road to rail at Barnes station, and asked that the company should take steps to remedy it.

Mr. Instone expressed his gratification at the results of the year, and congratulated the board and various officers for their part in bringing them about both on the railway and at Southampton Docks.

Mr. Hollins took the opportunity publicly to thank the Chairman and others associated with him for the friendly way in which the deputation of passengers had been received with regard to the Waterloo and City tube. He thought

that the shareholders would never regret the expenditure which was to be made to modernise that tube, for in his opinion in its improved condition it would attract many of those passengers who today found their way to the City by other means.

Mr. M. J. Hulbert, M.P., paid a tribute to the staff of the company for their share in introducing the present satisfactory results. He referred to the criticisms that appeared from time to time in the press with regard to Customs facilities at the ports, and urged that, as the company had no direct control over the Customs Department, that fact should be made quite clear so that blame should not be placed unfairly. He also suggested a clear statement to remove misunderstandings that were also ventilated in the press as to the limitations imposed upon travel agencies in regard to booking passengers for air transport companies.

Captain H. F. Davis asked a question about the capital expenditure on electrification.

Mr. Walter Scott expressed thanks for the fine new station the company had provided at Surbiton, and hoped the General Manager would convey to the staff of that station a message of appreciation for their efficiency during the awkward rebuilding period.

Mr. R. W. Sutton criticised the poster displayed by the Southern Railway on which appeared the words "Why run? There will be another train in a few minutes." He suggested that, in view of the fact that on certain suburban sections only a 20-min. or 30-min. service was provided in the slack hours, such a legend was likely to mislead. He also asked for cheaper day return fares to certain suburban stations, in order to compete more effectively with bus or tram services.

Mr. V. H. Smith asked why the weekly traffic returns did not include all receipts, such as those from the steamboats.

Mr. Ashley Brown expressed satisfaction at the deferment of the Hastings direct-line electrification. He mentioned that Mr. Holland-Martin was making a practical demonstration of his desire to maintain close contact with stockholders by his acceptance of the invitation of the Railway Stockholders Union to luncheon on March 30.

Mr. Hollins complained of the train service on certain country branch lines, and Mr. Willsher asked that the method of excessing tickets should be improved.

#### Chairman's Reply

The Chairman: My Lords, Ladies and Gentlemen, I thank you very much for the very kind reception you have given to me today. The questions that have been asked by shareholders have not been, I think, too difficult, and I am very glad to be able to elucidate some of the points.

Mr. Hunter was asking about the expenditure, and so was Mr. Hulbert, on electrification in 1938. The amount of capital in that year was £1,300,000, and we charged that against the Railway Finance Loan, a loan which we borrow at approximately 2½ per cent. With regard to the influence of the Coronation on our increased traffic, there were undoubtedly very large numbers of people travelling at that time, but you could not attribute them all to the Coronation, and it would be quite impossible to work out special figures for the Coronation. But, as I have told you in my speech, all being well, this year we hope that the figures will not retreat at the end of the year and that we shall still see an improvement.

Then Mr. Shand from Hassocks hoped that we would make it "cheaper to live in the country." We always want to help people where we can to live in the country, but it is very difficult to make tickets cheaper at one station and then give a little advantage here and another little advantage there. We are doing all we can, and we do issue a very large series of cheap tickets, and tickets which I imagine would be available for the conferences Mr. Shand speaks of at Haywards Heath.

Then Mr. Hedley spoke about the Barnes station. I know that place very well. It is a danger spot to get off the bridge into the station, on to the steps or from the steps on to the bus that stops on the bridge. The bridge is too narrow; but it is not for us but the road authorities to widen the bridge and give a proper pavement there. I am



very glad you have given us your plan, however, and we will look into the matter very thoroughly.

I thank Mr. Instone very much for what he has said. He seems to appreciate whole-heartedly all that we are doing generally. It is very nice when we meet people who really appreciate what we are doing and people who can put up suggestions as to how we can do better. We are always ready to welcome suggestions to improve your line. With regard to that point, Mr. Hollins was very nice to thank us for receiving a deputation about that horrible line that we sometimes call "the Drain" between Waterloo and the City. We know it, and we are ashamed of its present condition, and we mean to make it better, and I think with his help and with the help of the other members of the deputation, and our talk with them, it will be seen that we mean to do something; and I think when ultimately the result is seen we shall have something that will enable people to travel in comfort between Waterloo and the City. But it is very difficult. There was one suggestion made by a gentleman who wrote to the press, and he spoke as if it was easy to increase the bore of the tube or something of that kind—or hinted at it; we did not quite know what he did mean; but it is very very difficult. You are down, not in the London clay, but in the middle of a gravel stratum, and it would be very difficult and very expensive.

Then Mr. Hulbert referred to what I know is very often a grievance, particularly in Parliament—about air service bookings on the railway. Today the railway ticket agencies have permission to book for Imperial Airways, British Airways and two other English companies running to Paris. They also can book for practically all the internal air lines except in those cases where the services are directly competitive with the railway-owned air services.

Mr. Vere Smith asked why the weekly figures were not more than intelligent guesses and did not include revenue from our steamboats, which is the largest figure. A great deal of that revenue comes through the travel agencies, and it cannot be included in a weekly return, for it comes to us so much later.

I should like to refer to the tribute paid to the courtesy and helpfulness of our staff. We are very proud of that staff, and we want them to help our passengers as much as they possibly can. I am always having the greatest praise paid to them, and I am always thanking them for all that they are able to do.

Mr. Ashley Brown referred to our courage in putting off a piece of electrification. I think we gave very convincing reasons why we did so, and that that did not require a great deal of courage, when the figures showed so obviously that it would not have been a profitable line for us to electrify. As he has told you, I am going to have the pleasure of lunching with the Stockholders' Union in a very short time, and so I dare say he will speak to me a great deal more then. I am looking forward to that occasion. That, I think, concludes all the questions I need answer at the moment.

The resolution before you is: "That the report of the directors and statement of accounts for the year 1937 be and the same are hereby received and adopted." May I take it you agree?

The resolution was put to the meeting and declared carried unanimously.

The Chairman: The next business is the declaration of dividends. I will ask the Secretary to read the resolution.

The Secretary: "That the following dividends be and the same are hereby declared: For the half-year to December 31, 1937: 2½ per cent. on the 5 per cent. guaranteed preference stock; 2½ per cent. on the 5 per cent. redeemable guaranteed preference stock (1957); 2½ per cent. on the 5 per cent. preference stock; 2½ per cent. on the 5 per cent. redeemable preference stock (1964): (making in each case, with the interim dividends, 5 per cent. for the whole year). Three per cent. on the preferred ordinary stock (making, with the interim dividend of 2 per cent., 5 per cent. for the whole year). One and a half per cent. on the deferred ordinary stock for the whole year. And that such dividends be payable (subject to income tax) on March 3, 1938."

The Chairman: I move that resolution.

The Deputy-Chairman: I have much pleasure in seconding that resolution.

The resolution was put to the meeting and declared carried unanimously.

The Chairman: The next business relates to the retiring directors. There are six directors who retire at this meeting, namely, Mr. Amery, Mr. Dudley Docker, Lord Ebbisham, Sir Charles Morgan, Sir John Thornycroft, and myself. As stated in the report, we are all eligible and offer ourselves for re-election, with the exception of Mr. Docker, who desires to resign from the board. As I told you, Sir Herbert Walker, our late General Manager, is a candidate for the vacancy, and the directors recommend his election. I will ask the Deputy-Chairman to be good enough to submit a resolution.

The Deputy-Chairman: I beg to move: "That the following directors who retire by rotation at this meeting, namely, Mr. Robert Holland-Martin, the Right Hon. L. S. Amery, M.P., the Right Hon. Lord Ebbisham, Sir Charles L. Morgan and Sir John E. Thornycroft, be and they are hereby elected directors of the company." I will ask Lord Rockley to second that resolution.

Lord Rockley: I have much pleasure in seconding the resolution which the Deputy-Chairman has just moved.

The Chairman: I put that resolution to the meeting.

The resolution was put to the meeting and declared carried unanimously.

The Chairman: Now a further resolution is necessary in connection with the filling of the vacancy on the Board of Directors caused by the retirement of Mr. Docker, and I therefore move: "That Sir Herbert Ashcombe Walker be and he is hereby elected a director of the company in the place of Mr. Frank Dudley Docker, retired."

The Deputy-Chairman: I have much pleasure in seconding the resolution.

The Chairman: I put the resolution to the meeting.

The resolution was put to the meeting and carried unanimously with acclamation.

The Chairman: The next business relates to the auditors. It is necessary for two auditors to certify the annual accounts of the company, and the Minister of Transport was requested, as I said before, upon the death of Sir Albert Wyon, to appoint, under Section 12 of the Regulation of Railways Act, 1868, an auditor to hold office until the date of this meeting. The Minister appointed Sir Nicholas Waterhouse, a partner—as was the late Sir Albert—in the firm of Messrs. Price, Waterhouse & Company, who now offers himself for election by the proprietors. Sir Harry Peat retires on this occasion and also offers himself for re-election. The directors do not recommend the election of a third auditor. I will ask one of the proprietors to propose the necessary resolution.

Mr. M. A. Edwards: Mr. Chairman, Ladies and Gentlemen, I have much pleasure in moving: "That the number of the auditors of the company be reduced from three to two, and that Sir William Harry Peat, K.B.E., F.C.A., and Sir Nicholas Edwin Waterhouse, K.B.E., F.C.A., be and they are hereby elected auditors of the company, at a remuneration of £2,500 per annum, divisible between them as they may decide." If I may add a few words, it gives me personally very great pleasure to have the privilege to propose this resolution. Both of these gentlemen are very eminent members of their profession. I think they are known to all of you; they are certainly known to everybody in the City of London, and I think we are fortunate in having them to represent, as auditors are intended to do, the interests of the proprietors. I do not think any further commendation is required. I will therefore call, when this is seconded, for, I hope, your unanimous vote.

Major F. W. Butler: I have much pleasure in seconding that resolution.

Mr. M. A. Edwards: I put this resolution to the meeting.

The resolution was put to the meeting and declared carried unanimously.

### Special Business

The Chairman: The meeting now becomes special for the purpose of which notice is given in the advertisement con-

vening the meeting, namely, for the consideration of a new agreement that we are proposing to make with the Southampton Harbour Board relating to the working of their tramways by the company. For many years past the company has worked these tramways, which are actually the railway lines between the Terminus station and the Town Quay and now form part of the railway connection between our old docks and the new docks extension.

Under the agreement which expired on December 31 last the company paid the Harbour Board £500 per annum for the use of the tramways, in lieu of tolls on actual traffic passing, but in view of the growth of the traffic carried over the tramways the Harbour Board has asked that this payment be increased to £750 per annum from January 1, 1938, for a further period of three years. It is recommended that the request be granted, and your approval of the new agreement is now required. I will ask the Secretary to read the necessary resolution.

The Secretary: "That this meeting having considered the proposed agreement between the Southampton Harbour Board and the company for the use, working, maintenance, and management by the company of the Harbour Board's tramways, approves thereof."

The Chairman: I move that resolution.

The Deputy-Chairman: I have pleasure in seconding the resolution.

The resolution was put to the meeting and declared carried unanimously.

#### Wharncliffe Meeting

The Chairman: We now hold the special general (Wharncliffe) meeting to consider the company's Bill in Parliament. I will call upon the Secretary to read the notice convening the meeting.

The Secretary read the notice convening the meeting.

The Chairman: The principal objects of this Bill, as explained in the circular which has been sent to each proprietor, are to obtain powers to acquire additional lands for station and other improvements, and to stop up certain level crossings; and to authorise an increase of the rates and charges leviable by the company in respect of Southampton Docks. I will ask the Secretary to read the resolution.

The Secretary: "That this meeting having considered the

Bill intended to be presented to Parliament, intituled, 'A Bill to empower the Southern Railway to construct works and to acquire lands; to extend the time for the compulsory purchase of certain lands; to make provision with reference to the rates, rents, tolls, and charges which may be levied at the Southampton Docks of the company; to confer further powers upon the company, and for other purposes,' approves thereof subject to such additions, alterations, and variations as Parliament may think fit to make therein."

The Chairman: I beg to move that resolution.

The Deputy-Chairman: I have pleasure in seconding that.

The resolution was put to the meeting and declared carried unanimously.

The Chairman: That concludes the meeting, ladies and gentlemen.

Mr. M. A. Edwards: Ladies and Gentlemen, I think before we leave we ought just to testify our thanks to the Chairman for the manner in which he has performed his duties as chairman today and throughout the year, and the other directors for their services, and also to the staff, commencing with the General Manager, down to the lowest and humblest official of the company. If I may be allowed, I should just like to say how much I regret that advancing age has withdrawn from the service of the company Mr. Williams; I know how affectionately he is regarded by all the members of the staff who have come into contact with him. He is equally, if I may say so, loved by everybody who has ever had any occasion to come across him either officially or otherwise.

Captain Booth-Jones: I have much pleasure in seconding that resolution.

The resolution was put to the meeting and carried with acclamation.

The Chairman: My Lords, Ladies and Gentlemen and Mr. Edwards, I thank you very much indeed for so kindly giving us your thanks today. We are very grateful for that. We want to help all our shareholders, and they can help us in our development and in keeping the good will of the railway before everybody. We have an excellent staff, which, as I have told you before, is always working for the good of the railway. Now I want the help of all shareholders, and we hope in the future years to continue to give you as good reports as we have today.

## MERSEY RAILWAY COMPANY

### *Higher gross receipts—Good prospects for through working with L.M.S.R.*

The annual general meeting of the Mersey Railway Company was held at Winchester House, Old Broad Street, London, E.C.2, on February 24, Mr. John Waddell, J.P., Chairman of the company, presiding.

The Secretary and Accountant (Mr. J. E. Blacklin) read the notice convening the meeting.

The Chairman, in moving the adoption of the report and accounts, said that after making due provision for the renewal funds the net revenue for the year, as shown in Account No. 9 was £89,006, as compared with £89,049 for 1936. To this was added the amount brought forward from last year's account, £2,167, making a total of £91,173. After deducting from this sum the interest on the debenture stock, £56,143, the appropriation to the general reserve fund £1,000, and the dividend on the preference stock £19,472, making altogether £76,615, there remained a balance available for payment of dividend on the ordinary stock of £14,558, as compared with £14,524 for 1936, an increase of £34. Of this sum it was recommended that £12,357 be applied in payment of a dividend on the ordinary stock of  $\frac{1}{2}$  per cent., and that the balance of £2,201 be carried forward to next year's account, as compared with £2,167 for 1936.

The gross receipts from railway working for the year were £221,513, as compared with £216,969 for 1936, an increase of £4,544, or 2.09 per cent. The expenditure on railway working for the year was £131,410, as compared with £127,597

for 1936, an increase of £3,813, or 2.82 per cent. This left the net receipts from railway working at £90,103, as compared with £89,372 for 1936, an increase of £731.

The improvement in trade during 1936 was continued throughout the major portion of 1937. There was, however, a slight falling off during the latter part of the year which in some measure was due to abnormal traffic during the heavy fogs experienced in November and December in 1936. The effect of fog in the area the railway served was to drive people using the river transport services to the safe and speedy services afforded by the Mersey Railway. After mature consideration, the board decided to postpone any increase in local fares, although authority was obtained to do so. With regard to through fares between the Mersey Railway and other companies, the 5 per cent. increase had been applied.

During the past twelve months working expenses had increased considerably due to the restoration of the remainder of the wages deductions imposed in August, 1928, and the increased price of coal and other materials. Fortunately, when it was apparent, towards the end of 1936, that the prices of steel goods were about to rise, three years' supplies of running rails, conductor rails, tyres, and axles, &c., were purchased and put in stock at prices much below those obtaining today, which had assisted to keep expenses lower than what they otherwise would have been.

The new through service of electric trains between Liver-

pool, West Kirby, and New Brighton would be begun on Monday, March 14. It was confidently expected that the electrification of the Wirral Section, L.M.S.R., and the introduction of a frequent service of through trains would do much to accelerate the development of the areas served, both for residential and holiday purposes, which should prove to the mutual advantage of both companies.

After 36 years of continuous service Mr. Shaw had reached the retiring age. Joining the company in 1902 as Engineer, he was responsible for carrying out the work entailed by the change-over from steam to electric traction, and during the last two years had been occupied in making the necessary modifications to the Mersey Railway for through electric working with the Wirral Section of the L.M.S.R., which had entailed a great deal of extra work. Mr. Shaw had filled simultaneously the three positions of General Manager, Engineer, and Secretary, and the board felt that it would be practically impossible to find a substitute for Mr. Shaw who would be capable of filling all three positions with such outstanding ability, and had therefore decided to make two appointments to cover the three positions. The board had therefore adopted Mr. Shaw's recommendations and appointed Mr. R. Varley, who for the last 3½ years had been Assistant to the General Manager and Engineer, as Acting General Manager and Engineer, and Mr. J. E. Blackdin, who had been Accountant for the last 8 years, as Secretary and Accountant.

Although Mr. Shaw was retiring, he had, subject to shareholders' confirmation, agreed to accept a seat on the board, thus enabling the company to benefit by his exceptional

knowledge of local matters which had to be kept continuously in mind by the board. All who had been acquainted with the steady growth of the railway service since it was electrified, would admit that Mr. Shaw had, during those years, rendered an exceptional service to the company; it had been a life's work entailing heavy burdens and responsibilities. These characteristics, together with his tactful and courteous manner, had won for him respect from all who had come into contact with him.

It was difficult to prophesy with accuracy as to the prospects for 1938, but it would appear that if trade conditions remained stable and the through service with the Wirral Section resulted in increased traffic, as was anticipated, the effect should be satisfactory to the company.

The motion was put to the meeting and the report and accounts were unanimously adopted.

The motions for the increase of the board to five directors, and for the election of Mr. Shaw, were carried with one dissentient.

Mr. Shaw expressed his thanks for his election as follows: "I would like to thank you very much for the honour you have done me at the close of 36 years' active service in electing me a Director of the company. It will be a pleasure to me to work with the members of the board and to do all I can to help to improve the position of the Mersey Railway, and it will also be a great pleasure to me to do all I can to assist the officers who are following and taking up my work; and any knowledge or experience I have got of the Mersey Railway is at the disposal of the company and the officers of the company."

## BELFAST & COUNTY DOWN RAILWAY

### *A critical position—Passenger receipts decrease—New stock for Bangor branch—Loss incurred under Transport Act—Representations to Government*

The annual meeting of the Belfast & County Down Railway Company was held at the Station Street terminus, Belfast, on February 24, Mr. Thomas Barbour, J.P., Chairman of the company, presiding.

The Chairman, in moving the adoption of the report and accounts, said the position of the railway at the end of 1937 continued to be a source of grave anxiety. Gross receipts from all sources were £185,496, a decrease of £4,289, railway receipts falling by £3,329, and hotels receipts by £874. Total expenditure was reduced by £3,665 to £170,665. The net income of £14,842 was £623 less than last year. He regretted exceedingly that the holders of the 5 per cent. and 4 per cent. preference stocks, and of the ordinary stock, would be called upon to forgo any return upon their holdings.

It was useless to disguise the fact that their position was exceedingly critical, and he ventured to assert that they could not stand alone among Northern Ireland railways in those unenviable surroundings. The public would never consent to allow the railways to close down. It was incumbent on the Government, upon whom the responsibility for the Transport Act of 1935 rested, to take drastic action in order to bring about a lasting remedy. It was sincerely to be hoped that the outcome of the independent committee's investigation into the Transport Act might lead to a satisfactory solution and help to restore the prosperity of their company.

Gross receipts from railway working alone were £3,329 less than in the preceding year. It was desirable that the Irish railways should be allowed a 5 per cent. increase in their rates like that granted in England, as the rise of approximately 20 per cent. in the cost of the principal commodities used in operation made expenditure out of proportion to receipts. The diminution of passenger receipts was partly accounted for by the withdrawal of two road motor racing events. First class passengers had again decreased by 2,090, lost on short journeys for which the use of motorcars, stimulated by the lower horsepower tax, was growing. In the second class there had been a serious re-

duction of 10,215 in numbers and £470 in receipts. Third class traffic, on the other hand, gained 136,599 in numbers and £1,895 in receipts, a gratifying result seeing that it followed and surpassed large increases in 1935 and 1936.

Workmen's tickets had fallen by 61,794 in number, and first and second class season tickets had decreased by ten and four per cent. respectively, while thirds had increased by nine per cent. The total monetary decrease in season tickets was £462. A certain amount of the traffic had gone to Transport buses.

Two new composite bogie coaches had been put in service on the Bangor branch, where it was hoped that their comfort would regain for the railway some of its previous patrons. The company was not in a position to raise capital for introducing diesel traction on that branch, as there was no guarantee of additional traffic being created by that means. The present Bangor service was sufficient for requirements.

The result of the working of the Transport Act had been highly disappointing as far as the company's receipts were concerned. Not only had they suffered a direct loss by the diversion of a percentage of their traffic to the road, but they had actually been asked to incur a financial liability in respect of the pooling scheme which, in their present critical state, would cripple them in a disastrous manner. The board had done everything in its power to submit the company's case and stress its urgency in Government circles.

After the motion had been put to the meeting, Mr. M'Cracken, a shareholder, criticised the railway on the grounds of inadequate services and lack of acceleration. He complained that the introduction of railcars advocated by the Shareholders' Protection Association for the purpose of economy had been opposed by the directors.

The Chairman, replying to this and other remarks, said the board was not in opposition to the shareholders' association, and welcomed every criticism, but they had received nothing from the association but fantastic suggestions about railcars.

The report and accounts were adopted.



## GREAT NORTHERN RAILWAY COMPANY (IRELAND)

### *Cost of materials—Increased receipts essential to efficient service—Road Transport Board losses—Hotels progress*

The annual ordinary general meeting of the Great Northern Railway (Ireland) was held in the Grosvenor Minor Hall, Glengall Street, Belfast, on February 28, Mr. William Bruton Carson, Chairman of the company, presiding.

The Secretary (Mr. F. C. Wallace) read the notice convening the meeting.

The Chairman said: As the directors' report and statement of accounts have been in your hands for some time, I shall, with your consent, take them as read and proceed to deal with the principal items in the accounts. The final results of the year have been disappointing, so that we have had once again to draw on our reserves to the extent of £9,062 to meet the interest and dividend on the debenture and guaranteed stocks. This is due to the large increase in expenditure with which I shall deal later.

#### **Slightly Increased Gross Receipts**

The gross railway receipts show a slight increase of £4,183 (0.4 per cent.). The passenger train traffic produced £15,741 (2.8 per cent.) more than in 1936, but the goods train receipts were £11,853 (2.3 per cent.) less. Joint lines and miscellaneous receipts were practically unchanged. Merchandise traffic shows an increased tonnage of 16,959 (3.3 per cent.), but this is offset by a decrease of 16,303 tons (9.7 per cent.) in coal, coke, &c., traffic. The falling off in coal, coke, &c., is disappointing, as an increasing quantity of these commodities is, I regret to say, now passing by road, partly in coal merchants' own lorries and partly by "hawkers." The number of livestock carried during the year was 49,685 (10 per cent.) more than in 1936, but the receipts are down by £1,525 (2 per cent.). Fewer horses, cattle and sheep were carried, but there was a substantial increase in the number of pigs.

The total traffic expenditure of £983,536 is £3,953 (0.4 per cent.) more than in 1936. Rates paid were £8,528 less than in 1936 in consequence of the lower valuations of the railway properties and the running lines. These were reduced as from April 1 last at the quinquennial revision, but the directors are dissatisfied with the new valuations as fixed by the Commissioners of Valuation and have lodged notice of appeal to the Courts. We are hopeful that further relief will be forthcoming under the head of "Rates." Under the provisions of the Local Government (Finance) Act (Northern Ireland), 1936, the company's contribution in rates to the Railway Freight Rebates Fund was discontinued as from January, 1937, with the result that expenditure under this head, which amounted to £17,617 in 1936, disappears from the accounts.

#### **Higher Costs and Wages**

As you are aware, there have been large increases in the prices of practically all materials which are necessary for the maintenance of the undertaking. For instance, coal cost us £10,220 more in 1937 and I regret to say there is every prospect of an equally large increase this year. A factor which leads to increased expenditure is the almost invariable delay in obtaining delivery of materials. As an instance, the two diesel railcar units, which we had hoped to have had in service last autumn, are, owing to non-delivery of the engines, now only being completed. In addition, we have been met with demands from all sections of our employees for increased wages. These demands were most carefully considered, and, as the result of protracted negotiations with the several trades unions, were conceded in modified form. In a full year the increases so given amount to about £21,000.

During the year we put into service five mixed traffic locomotives which were built in our works at Dundalk. These, which had to take the place of engines that had outlived their normal life, have proved most useful and

economical. We also built four carriages of the most modern design. Miscellaneous receipts at £33,725 are £1,703 less than in 1936.

#### **Road Transport Results**

Although the gross receipts of the road transport services are up by £5,321, the maintenance and operating expenses were, I regret to say, much heavier than in 1936, due to increased wages costs, abnormally heavy outlay on repairs, and increased prices of materials. Here again, we were held up by delay in deliveries, as many of the new buses, which should have been ready for service for the summer traffic, could not be completed until September, and, in consequence, money had to be spent on putting into condition and in running others which were less economical. The net profit is £3,111, which is a decrease of £10,234.

Your directors continue to hold the opinion that, although diesel railcars may still be considered to be in the experimental stage, they are, under certain traffic conditions, more economical than steam trains, and therefore two more units are at present being completed in the company's shops, but, as I explained earlier, they are not yet ready for service. Our railbuses are continuing to work satisfactorily and have enabled us to put on extra services which have developed traffic and have proved successful financially.

Several new factories have recently been established in towns on our system, from which we are obtaining a certain amount of traffic, but there is one large undertaking which I should like to mention—that is the new cement factory at Drogheda. After prolonged negotiations with Messrs. Cement Limited, I am glad to say that we have come to terms in regard to rates for conveyance of the traffic from the Drogheda factory, and have constructed a siding to their works on mutually satisfactory terms.

#### **Catering Department Successful**

The Hotels and Refreshment Department continues to do well. Early last year Bundoran hotel was, to a large extent, modernised and re-decorated. The effect of the expenditure in this connection was very striking and much appreciated by the largely increased number of visitors. We look forward to a further successful season this year, feeling that your hotel at Bundoran will provide all that any person can desire. The golf course is also being extended and remodelled, and it is expected that these alterations, which will be completed in the early summer months, will provide added attractions for the discerning holiday-makers who each year search for something new—and satisfactory. Rostrevor and Greenore hotels have also been kept in good order, and they are patronised regularly by people who have been highly satisfied, and, who, from health standpoints, have benefited by their visits. The dining, buffet, and tea cars continue satisfactorily to meet the requirements of the travelling public.

The profit on the whole department of £4,382, though a decrease of £483, can be regarded as satisfactory in view of the fact that during the year a special expenditure of about £900 had to be incurred at Bundoran.

#### **Record Traffic from England and Scotland**

The year 1937 opened unfavourably, a general epidemic of influenza having militated against passenger traffic. Until July the weather was very uncertain and this was particularly noticeable at the week-ends when we looked for good local seaside traffic. However, from July onwards the passenger traffic improved, in fact the English and Scottish traffic to Northern Ireland was of record proportions, and with favourable weather the volume was well maintained until the end of the season. With the visit of Their Majesties the King and Queen to Belfast in July a very large passenger

traffic was also dealt with. It may be pointed out that, on occasions of peak volumes of traffic, which do occur from time to time, the services which railways give to the public are indispensable—for instance, on the occasion of the Gaelic Athletic Association football match between Cavan and Kerry in September last, when we carried to Dublin no fewer than 13,000 passengers.

We continue to offer every inducement to both tourists and excursionists, and shall do our part in developing this traffic, bearing in mind our reputation for giving good service to the travelling and trading public. In this connection, we have a large assortment of attractive pictorial posters which are widely exhibited both in this country and in Great Britain.

#### Road Transport Board

Many of you will, doubtless, have seen the results of the first year to September 30, 1936, as reported by the Northern Ireland Road Transport Board, which show a very large loss in working. Although the figures for the year to September 1937 are not yet available, we have reason to expect that they will show an even worse result. The pooling scheme established under the Act took effect from January 1, 1936, but the figures relating to the year ending December 31, 1936, have yet to be audited and carefully considered before they can be accepted by the railway companies.

Under the Road and Railway Transport Act, the Road Board is obliged: "To secure, in conjunction with the railway companies, the provision of a system of transport which is properly co-ordinated," and also to conduct its affairs so as to secure that its revenue shall be sufficient to defray all necessary charges. Neither of these obligations has been carried out, and the result has been that heavy losses have been incurred in providing road transport in Northern Ireland. If, therefore, radical and immediate improvements in the operation of the Act are not promptly made a catastrophe will occur.

#### Increased Railway Receipts Essential

It is quite impossible for this company to bear the cost of higher prices for materials and supplies and higher wages unless the receipts are very considerably increased. Our resources are insufficient to meet the continuous expenditure which is necessary if efficiency is to be maintained in the locomotives and modern standards in the rolling stock. In

brief, the position is that any further loss, after providing for the heavy expenditure which has to be met, will place the company in a state of great and embarrassing financial difficulty. This position is not peculiar to the Great Northern Railway and it may be said to apply also to other railway companies. Unless, therefore, receipts for railway services increase, at least in proportion to the actual increase in expenses the company has to bear, the railway services will, unfortunately but inevitably, deteriorate.

The Transport Act was passed with the object of placing transport in Northern Ireland on an economic basis; this, unfortunately, has totally failed of attainment. The public and the responsible authorities must recognise that transport is being provided at much under cost by means of heavy subsidies, represented in the case of the Road Board by losses of some hundreds of thousands of pounds guaranteed by the Government, on which no interest is being earned and, in the case of the railways, by the fact that in 1937 £15 millions of railway capital earned as little as 1.04 per cent. Consequently, as soon as the long awaited results of the board's activities were available and it was found that its operations, if continued on the lines of the policy hitherto followed, would eventually prove disastrous both to the Road Board and the railways, the three companies at once approached the Government to impress upon them the necessity for taking immediate steps to implement the intentions of the Act.

#### Government Transport Commission

I am glad to say that the Government, recognising the seriousness of the situation, has appointed a commission to investigate the operation of the Act and to advise what is necessary to secure an economic transport system, so as to avert what, with a full sense of responsibility, I can only describe as an impending disaster if drastic remedies are not quickly applied. In conclusion, I feel it would be your wish that I should again take this opportunity, which occurs only once a year, to thank the staff, from the highest to the lowest member, for the zeal and efficiency with which they have carried out their duties. I am sure we can rely on them not to relax their efforts to further the interests of the company, the welfare of which we all have so much at heart.

I now beg to move the adoption of the report and accounts.

The Deputy Chairman seconded the motion, which was carried unanimously.



An artist's impression of the British Railways pavilion at the forthcoming Empire Exhibition, Glasgow. Moving spirals of coloured light will encircle the mast at night

## STAFF AND LABOUR MATTERS

### Workmen's Compensation— Home Office Committee

The committee appointed by the Home Secretary in 1935 to inquire into various questions under the Workmen's Compensation Acts has now issued its report, which is on sale at H.M. Stationery Office. The report deals with miner's nystagmus, medical examination and certification by medical referees and certified surgeons, and computation and control of lump sum payments.

In connection with miner's nystagmus, the committee recommends, amongst other things, that medical boards should take the place of medical referees and that insurance against employers' liability should be compulsory.

On medical procedure the committee recommends that the medical referee system should be maintained, but the decision of a referee should no longer be conclusive. The panels of referees should be enlarged and strengthened by the inclusion of considerably more specialists. Medical appeal tribunals should be set up by the Home Office. The right of employers and workmen to arbitrate on medical issues should be withdrawn; and medical issues, save in the wholly exceptional cases, should be determined by the medical referee, subject to appeal to the Medical Appeal Tribunal.

As regards medical referees the committee recommends that a small medical committee, including a representative of the Home Office, should be set up to advise on appointments to the panels; the rules designed to secure the reputation of the referee for impartiality should be strictly observed; and the decisions of the medical referee should be effective unless and until they are overruled by the Medical Appeal Tribunal.

As regards medical tribunals of appeal, the committee recommends that tribunals be established in about 10 or 12 large centres; panels of practitioners qualified to act as members of the tribunal should be drawn up for each area; a tribunal should normally consist of three members, one at least to be an appropriate specialist; the assistance of the Ministry of Health (in Scotland the Department of Health) should be sought in making the necessary administrative arrangements; the cost should fall on employers and workmen with a contribution from the Exchequer. Appellants should pay a substantial fee, but there should be power to the Registrar to waive the fee exceptionally, in the case of a workman without means, when there appear to him to be reasonably good grounds for appeal; procedure before a medical appeal tribunal should be on lines indicated in the report.

The committee further recommends that there should be an alteration in

the regulations in regard to the period allowed for an appeal against the certificate of a certifying surgeon, and there should be a greater measure of supervision by the Home Office over the performance of the certifying surgeons' duties under the Act.

In connection with lump-sum settlements by agreement the report states that "lump-sum settlement is generally popular with both employers and workmen. Generally lump sums are used to advantage. Cases of misuse do occur, but the evidence is that misuse is not extensive."

The committee recommends that the right of employers and workmen to settle by agreement for lump-sum payments should be maintained subject to existing provisions and to the following amendments: (1) The Registrar should see the workman in every case and should record no agreement without full enquiry and a recent medical report; (2) in any case of doubt the Registrar should insist on examination and report by the Medical Referee. The committee further recommends that a lump sum of more than £100 should be paid through the Court for the purpose of affording the Registrar an opportunity to advise the workman as to its use; but there should be no power to retain or control the money in any way.

The Government has not yet intimated its decision on the report.

### Railway Shopmen: Industrial Court Award

The Industrial Court sat on November 29, 1937, and January 13 and February 24, 1938, to hear the claim of the National Union of Railwaymen that a slater and a labourer when employed on the roof of Wood Street engine shed, Walthamstow, London & North Eastern Railway, on May 20, 21 and 22, 1935, were entitled, in accordance with the provisions of Condition 11 of Schedule "F" to Industrial Court Decision No. 728, to extra payment in respect of the dirty nature of their work.

The union contended in support of the claim that the roof of an engine shed, by reason of the use to which the shed is put, is much dirtier than the roof of an ordinary building. It was stated that the roof boards of the Wood Street shed were thick with dirt and grease which penetrated the men's overalls, leaving stains on their clothing which could not be removed by washing, and that while the men were at work smoke and steam from the engines came up through the spaces between the roof boards. It was also stated that the two men concerned in the claim had, on previous occasions, claimed and received a dirty work allowance when working on engine shed roofs, and it was submitted that this substantiated the contention that work on engine shed roofs is considerably dirtier than work on roofs of ordinary buildings.

As against the claim the company contended that men were no more entitled when working on engine shed roofs to an allowance under Clause 11 of Schedule "F" of Industrial Court Award No. 728 than when they were working on the roofs of other buildings. The existence of abnormal conditions must be shown before extra payment can be made. It was submitted that it is part of a slater's ordinary duties to renew slates on engine sheds, and that the work of the slater and labourer in respect of which the present claim is made, was not sufficiently exceptional to justify the payment of an extra allowance. If the work involved the dismantling or stripping of a large portion of the roofs, possibly for a considerable time, and it was necessary to work over or near the smoke troughs, or in the vicinity of the smoke shaft, the circumstances might merit an extra allowance. In the present case the job was a small maintenance one, consisting of the renewal of the slates, and the roof boarding was not disturbed. The Wood Street shed is a small one and during the day time there are not more than two or three engines in or about the shed.

The company also made reference to previous decisions of the Industrial Court, in particular to Awards Nos. 990 and 1,579, which, it was submitted, supported its contention that the fact that the work is done on an engine shed does not alone make the work abnormal, but that it is necessary to have regard to the work done and the conditions under which it is carried out, and it was submitted that in the present case no extra payment should be made.

The Industrial Court, by Award No. 1,698, decided that no extra payment is called for.

### Holidays—Blast Furnacemen

An agreement has been reached between the National Council of Associated Ironmasters and the National Union of Blast Furnacemen whereby blast furnacemen will have seven consecutive working days' holiday with pay each year. The scheme comes into operation in April and benefits 17,000 men. The agreement covers 90 per cent. of blast-furnace plant in England and Wales.

### Wages Claims—London Transport

At a meeting in London on March 1 agreement was reached between the London Passenger Transport Board and the National Union of Railwaymen, the Associated Society of Locomotive Engineers and Firemen, and the Railway Clerks' Association in regard to the claims submitted by the three unions for improvements in rates of pay and conditions of service of the staff employed on the board's railway undertakings. Details of the settlement will not be made known until the agreement is ratified by the authorities.



## QUESTIONS IN PARLIAMENT

### Manchester Transport

Mr. Ellis Smith (Stoke-on-Trent, Stoke—Lab.) on February 23 asked the Minister of Transport if he would call a conference of representatives of the local authorities within an approximate 50-mile radius of Manchester, the L.M.S.R. and the L.N.E.R., for the purpose of considering the need of unified control of transport and the construction of an electric railway system radiating over the whole area. He also asked the Minister of Transport if it was his policy to encourage the organising of regional control of transport where it was essential; and what steps were being taken, or were contemplated, with a view of securing regional organisation and control.

Dr. Leslie Burgin (Minister of Transport): I am always ready to give sympathetic consideration to any sound scheme for promoting co-ordination and increased efficiency in transport services. It is for the local government authorities and transport interests concerned to take the initiative in the establishment of a regional scheme.

Mr. Ellis Smith: In view of the need for an organisation of the kind suggested in the question in the area referred to, will the Minister adopt a policy which will stimulate action of this kind in areas where it is required.

Dr. Burgin: I shall be glad to receive suggestions. I think the area he mentions in his first question an extremely wide one, wider than anything yet suggested, but if plans come before me they will receive careful consideration.

### Cheap Excursion Tickets

Mr. T. Cassells (Dumbartonshire—Lab.) on February 23 asked the Minister of Transport when the House would have a definite statement from his department following on the promised negotiations with the railway companies concerned regarding the issue of cheap excursion tickets and legal liability for damages attachable thereto.

Dr. Leslie Burgin: I hope soon to be able to make such a statement. Discussions are continuing.

### Special Fares and Facilities for Empire Exhibition

Mr. David Kirkwood (Dumbarton Burghs—Lab.) on February 23 asked the Minister of Transport whether he would make representations to the railway companies of this country to run cheap excursions from all over the country to Glasgow when the Empire Exhibition was opened in May this year, in order that thousands of persons in Britain who had heard of the River Clyde might have an opportunity of seeing it as well as the exhibition.

Dr. Leslie Burgin: The railway companies, in conjunction with the exhibition authorities, have been giving careful consideration to the question of

offering special fares and facilities in connection with the Empire Exhibition. A public announcement will, I am informed, be made very shortly.

Mr. Kirkwood: Will the Minister of Transport use his influence in order to see that the railway companies grant every possible facility?

Dr. Burgin: I am anxious that transport facilities at this important Empire Exhibition should be of the best possible character.

### Level Crossings

Mr. G. R. Hall-Caine (Dorset, E.—U.) on February 23 asked the Minister of Transport how many railway level-crossings still existed on the trunk roads under the control of his department; what would be the approximate cost of their removal; and by what date it might be assumed that there would be none remaining.

Dr. Leslie Burgin: There are 84 railway crossings and 31 colliery and other crossings remaining on trunk roads. My desire is progressively to remove them all. Having regard however to the numerous factors which must be taken into consideration in each case, it is not possible to give undertakings as to dates and times.

### Revenue of Railways

Mr. Tom Williams (Don Valley—Lab.) on February 24 asked the Minister of Transport what were the total gross receipts of the British railways for the year 1937.

Dr. Leslie Burgin (Minister of Transport): I am not yet in a position to furnish the information asked for, but I expect that the annual preliminary statement relating to the railways of Great Britain for the year 1937 will be published about the middle of March.

### Cheap Tickets: Companies' Liability

Mr. Robert Gibson (Greenock—Lab.) on February 24 asked the Secretary to the Treasury whether the Treasury regulations regarding travel by rail of members of the Naval, Military, Air, and Civil Services covered the payment of compensation to the representatives of any such member killed while travelling on a cheap or period ticket, in view of the fact that the representatives concerned were deprived of their common-law remedies against a railway company and that the regulations required a cheap ticket to be purchased where such was available.

Lieut.-Colonel D. J. Colville (Financial Secretary to the Treasury): Yes, sir. I am sending the hon. member a copy of the undertaking given as regards payment of compensation in the case of civil servants who are injured while travelling on official business with cheap tickets under official instructions. Corresponding arrangements would be applied to members of the Naval, Military, and Air Forces.

### Level Crossings

Mr. G. H. Oliver (Derby, Ilkeston—Lab.) on February 28 asked the Minister of Transport if he would state the number of cases in the last five years in which the powers under Section 7 of the Railways Clauses Act, 1863, had been exercised by which a railway company was required to erect a bridge in place of a level crossing.

Captain Austin Hudson (Parliamentary Secretary to the Ministry of Transport): These powers have not been exercised during the past five years. The hon. member will be aware that a number of level crossings have been eliminated by the construction of bridges by the highway authority with the aid of grants from the Road Fund.

Mr. Oliver: Is there any particular reason why this section has not been applied during the past five years in view of the need for doing something in this direction independently of the local authorities?

Captain A. Hudson: Under Section 7 level crossings have to be eliminated on the ground of public safety. A large number of them have been eliminated on the ground of public convenience and this has to be done by way of grant, and so forth.

### Gas-Lit Coaches

Mr. H. Day (Southwark, Central—Lab.) on March 2 asked the Minister of Transport whether he would give the number of gas-lit coaches still operating on the British railways steam-worked coaching stock; and what progress had been made by the railway companies during the last three years with the conversion of their gas-lit coaches to that of lighting by electricity.

Dr. Leslie Burgin, in reply, circulated the following information:—The numbers of passenger carrying coaching vehicles (other than electrically operated) owned by the railway companies at December 31, 1935, 1936, and 1937, which were lighted by gas and electricity respectively were as follow:—

	Lighted by Gas	Electrically lighted
1935	9,713	30,510
1936	7,437	32,411
1937 provisional figures	6,295	34,586

### Castlecary Accident and Damages

Mr. Tom Cassells (Dumbartonshire—Lab.) on March 2 asked the Minister of Transport whether the railway company involved in the Castlecary railway disaster, in which one person killed and thirteen injured were holders of cheap day tickets, had agreed to pay damages in respect of loss, injury, and damage suffered, consistent with common-law liability.

Dr. Leslie Burgin (Minister of Transport): I am informed by the L.N.E.R. that it is not the company's intention to plead, as against the holders of the cheap day tickets to which the hon. member refers, any special contract limiting the company's liability in respect of the loss, injury, and damage suffered by those holders in the Castlecary railway disaster.

## PARLIAMENTARY NOTES

### L.N.E.R. Bill

On the motion on February 24 that the London & North Eastern Railway Bill be read a second time,

Lord Apsley (Bristol Central—C.) said that a certain number of Opposition members had been objecting to this Bill on the ground that there were differences of pensions in favour of this railway company as compared with others, and other Members of the House, who were not present, had been objecting to the Bill, not as a Bill, but had been objecting to it, and intended to object to all railway Bills, on the ground that the railways had not been affording facilities for booking for airways which were not connected with the railways. That matter had

been raised in the House before, and arising out of conversations which took place, certain airways companies had been giving booking facilities—Imperial Airways, Railway Air Services.

The Speaker intervened and said that according to a Ruling given by his predecessor in a similar case, he must rule that Lord Apsley was not entitled to take advantage of the fact that there was an omnibus Bill of a particular Railway Company to raise a grievance which applied not to that particular railway company alone, but to all other railway companies. Therefore the reference which Lord Apsley was making at the moment would not be in order on that Bill.

Lord Apsley said he was aware that he would not be in order on this Bill, and he wished to take the opportunity to state that objections would therefore continue, both in that House and in the House of Lords.

The Bill was read a second time.

### Indian Railway Bill

The Bombay, Baroda and Central India Railway Bill was read a third time and passed in the House of Lords on March 1.

The object of the Bill is to amend the Bombay, Baroda & Central India Railway Act, 1906, and to enable the Bombay, Baroda & Central India Railway Company to provide road and air transport services, and for other purposes.

The Bill was formally read a first time in the House of Commons on March 1 and referred to the Examiners of Petitions for Private Bills.

### Debate on Modern Advertising

On February 17 the G.W.R. (London) Lecture & Debating Society held a debate with the Bank of England Debating Society at the Bank of England. Mr. C. J. Hambro presided over a large gathering. The Bank proposed the motion "That modern advertising is an insult to public intelligence." It was urged by Messrs. Guiseppi and Cook, leading for the Bank of England, that modern advertising, by appealing to and exploiting the baser human instincts and feelings, such as snobbery, ostentation, fear, and vanity, aimed at such a low level as to be insulting to public intelligence. No reasonable person would take seriously much of the advertising which could be seen everywhere. In this country public intelligence was perhaps at its highest, as political life showed, and it was beginning to resent and condemn the publicity with which it was confronted. Everybody present at the meeting could see the credulity which advertising implied, and that being so, it could be said that the public at large could see it. The public was not taken in.

The case for the opposition, led by Messrs. Thurtle and Wilson for the Great Western Railway Society, was that it was in fact impossible for modern advertising to be both an insult to public intelligence and successful. Advertising was highly successful because it was continually searching for the level of public intelligence at which to aim. Selective advertising aimed at different levels of intelligence. If advertising did not at first hit the right level, it tried again until it did. The qualitative level of advertising moved up and down but only as it followed and had to follow the level of public intelligence. This was not so high as the proposers would like to show; indeed it was lamentably low; one had only to look at the ways in

which many people spent their leisure. Just as people had the government they deserved, so they had the advertising. It was also argued as regards the word "modern," that the advertising of fifty years ago was worse. Advertising aimed to be in fact an accurate estimate of public intelligence; if it were not, it would be unsuccessful and the manufacturer would have to try some other form of publicity.

After a lively and diverting debate the motion was put to the vote and lost by 94 votes to 73.

### Wartime Demolition of Great Chinese Railway Bridges

Three of the largest bridges on the Chinese railways have now been more or less demolished either by retreating Chinese troops or by Japanese bombing or bombardment. As recorded in our issue of February 25, in which we also published an illustration of the bridge as damaged, the Tientsin-Pukow Railway bridge over the Yellow River near Tsinan was practically destroyed to delay the advance of the Japanese along this main trunk line from Peking and Tientsin towards Suchow—junction with the transverse Lung Hai Railway—Nanking and Shanghai.

It appears that more recently Japanese military engineers have erected a temporary bridge at this spot and that rail communication between Tientsin and Tsinan has been restored.

News now reaches us that the fine new bridge over the Chien Tang River near Hangchow, completed only last year, has also been very seriously damaged for the same reason. Five of the sixteen main 220-ft. spans—with road on the top boom and railway on the bottom—have been demolished, and have fallen into the river. The upper part of one pier has also been

blown away. The steelwork of these spans was supplied by Dorman Long & Co. Ltd.

Still more recently the two-mile long Peiping—Hankow Railway bridge over the Yellow River was, apparently, first seriously damaged by Japanese bombing, and subsequently more completely demolished by the Chinese to check the Japanese advance. This 30-year-old bridge has comparatively small spans carried on screw piles, and was of generally light construction, as its parts were carried to site in junks ahead of platelaying, so as not to delay the latter. It was intended as a temporary structure to be replaced later by a more permanent bridge, but this aim was never realised. Consequently, the piles were not carried down to such a depth as to secure complete immobility in flood-time, and had constantly to be pitched with rubble to prevent the bridge being carried away. Always a source of anxiety, it entailed a permanent and severe speed restriction, and is, therefore, possibly no great loss.

**POLISH RAILWAYS UNDER THE FOUR-YEAR PLAN.**—The Polish Government is reported in a Reuters message to have decided to expend large sums this year on improving the roads, railways, and waterways of the country. On the Gdynia-Upper Silesia Railway 29 million zlotys are to be spent for the purpose of facilitating the transport of Silesian coal to the Baltic port of Gdynia, which itself is to be improved. In addition certain other lines are to be built to improve communication between Warsaw and various parts of the country. Further electrification is also in the programme, including Warsaw suburban lines and the Cracow-Zakopane line. Altogether 12 million zlotys are to be spent on electrification work. It is stated that out of the total of 1,000 million zlotys only 100 million will be raised abroad.

## MINISTRY OF TRANSPORT ACCIDENT REPORT

Between Hindolvestone & Guestwick, M. & G.N. Joint Line:  
August 20, 1937

The M. & G.N. Joint line, on which this accident occurred, has been operated and maintained by the L.N.E.R. since October, 1936. As the 8.52 a.m. express from Leicester to Norwich, consisting of three L.M.S.R. corridor bogie coaches, drawn by L.N.E.R. 4-4-0 locomotive No. 6013, was running at high speed on an easy right-hand curve, all vehicles except the locomotive were derailed. There was extensive damage to bogies and undergear of the coaches, and the permanent way was badly damaged for 415 yd. Two passengers out of 16 were slightly injured. The weather was fine but there had been much rain the previous week. The line is single, operated by tablet apparatus with automatic exchangers. Major G. R. S. Wilson conducted the inquiry.

Approaching the site from the north, gradients are mainly falling at 1 in 117 and 1 in 100; the initial derailment was on a short level length in a dip between two gradients of 1 in 100 extending nearly a mile in each direction; curvature here is 60 ch., right-handed, and the formation practically level with surrounding fields, marshy and liable to flood after heavy rain, with a water-course crossing it. Permanent way was old G.N. type, new in 1903, with 30-ft., 85-lb. rails, weighing now about 78 lb., and not unduly side-worn. Chairs were 44-lb. with two spikes and two trenails, on 12 creosoted fir sleepers per rail, of which about one third appeared to be the original ones. The general condition of sleepers and fastenings was fair. Original sleepers had a few loose spikes, but most new fastenings and refastenings were by coach screws. Keys appeared good and tight. Ballast was rather large round gravel. The formation was stated to be boggy. Traffic is light, with nine passenger and three goods trains (average) each way daily in summer, and no booked Sunday service. The 11½ miles of line, the length concerned, has been maintained since January, 1935, by motor trolley with ganger, sub-ganger, patrolman, and five lengthmen.

The first sign of derailment was a single flange mark, crossing the low rail from inside to out in 26 ft. 7 in., preceded by a 4 ft. score on the running edge. The gauge varied over the 350 yd. preceding derailment from ¼ in. slack to ⅛ in. tight, but cross level was poor. Designed cant was 2 in., but varied between ¾ in. and 2½ in. over the 350 yd. preceding derailment.

Engine No. 6013 (of Great Central type) was last under general repair at Gorton in February, 1937, the mileage since being 17,675; minimum is 70,000 between general repairs. The flanges of engine and tender were very little worn. The total sideplay of tender axles was ½ in., ⅞ in., and

⅞ in., against ¼ in., 1 in., ¼ in. as designed, due to normal wear. The drawbar coil spring between engine and tender was exerting only 1½ tons instead of 12 as designed. The leading L.M.S.R. coach was last lifted at Wolverton in October, 1934, when the bogies were overhauled, tyres returned, and clearances restored to standard. The wheels were to gauge, but the tyres were worn appreciably hollow on the tread from ⅞ in. to ¾ in. bare, wear at the flange root varying from nil to ¾ in. Springs and attachments were in good condition. There was increased sideplay in the horn cheeks and appreciable wear in the swing link pins. Evidently the coach was approaching a condition when lifting and attention to bogies would be required.

The train left Melton Constable 14 min. late. The average booked speed thence to Norwich is 42½ m.p.h. and Driver P. B. Collins said he was coasting towards the site at 40 to 45 m.p.h. when he heard a "bumping and grinding" and then saw coaches "bumping up and down," leaning to the left. He applied the brake, when the coaches broke from the tender, which he felt derail. He was emphatic that the tender did not derail till then. Fireman T. E. Merrywest confirmed this evidence. Another driver and fireman gave evidence that they had experienced unsatisfactory riding at 60 m.p.h. on the curve and had lately run at reduced speed there. A note had been dropped to the ganger who acknowledged it and was told the driver would ease up and attribute lost time to the condition of the road. Other drivers had complained also. The District Engineer had replied to a complaint that one or two joints had needed packing and the road was again in order.

The patrolman inspected the curve the day before the accident and noticed no defect, but eight days earlier he reported the road as needing attention and the gang went there, attending to low joints, he thought. Four days after the accident he noted joints down and reported them. The curve was troublesome.

The ganger confirmed this, and said that the curve went out of order quickly after heavy rain and there had been thunderstorms during the previous week, water remaining in the fields. Track level was, he asserted, not seriously defective on August 16.

The permanent way inspector also said the curve had been troublesome for some years, due to wet formation. He rode fortnightly over all lines in his district, which, on the whole, was not difficult to maintain. He was satisfied with the ballast on the curve. The chief permanent way inspector was

generally satisfied with maintenance on the section.

Five test runs on the curve were made with Driver Collins and a very similar train, at 32, 37, 42, 44½ and 47 m.p.h., the track being made irregular by special sleeper packing. On the last three runs Major Wilson was on the footplate; oscillation at 47 m.p.h. was considerably more than at 44½ m.p.h. but was neither violent nor alarming. Amplitude of engine movement appreciably increased at each comparatively small increase of speed.

### Inspecting Officer's Conclusions

Speed may have been considerably higher on August 20 than the train crew stated: 60 m.p.h. was quite normal at the point. The weight of evidence is that the right leading tender axle was the first to be derailed and the road may have been burst by the intermediate and trailing wheels following the first to the inside cress at a broken joint on the low rail; the remaining train wheels were probably derailed by this bursting. The derailment of the leading tender axle may not have been instantly detected above the ordinary noise. The cause of the derailment cannot be determined with certainty, but it was possibly rolling and lateral oscillation—with perhaps partial relief of weight on the right leading tender wheel—due to high speed, irregular cross level, and rolling stock not in best condition; alignment of the curve may also have been irregular. Although the company's engineers do not consider the irregularities in super-elevation sufficient in themselves to cause derailment, even at 60 m.p.h., the worn condition of the leading coach and slack engine drawbar spring would tend to increase lateral oscillation.

Major Wilson is not convinced that the staff fully appreciated the degree of attention required to the track under the conditions prevailing. The curve has since been surveyed, realigned, and transitions introduced, and has been kept under observation. Super-elevation appears now well maintained but observation should be continued and, if necessary, consideration given to lifting and reballasting with superior grade material. Drivers should report unsatisfactory riding, not to a ganger, but officially to headquarters, as such reports are valuable in informing the engineer of defects in general, particularly those more far-reaching ones of which the remedy may be beyond the control of local staff. More frequent examination, with tension removed, of intermediate engine drawbar springs may be desirable.

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RAILWAY CONVALESCENT HOMES.—The spring banquet of the Railway Convalescent Homes will be held on Wednesday, March 23, in the Wharncliffe Rooms, Hotel Great Central, at 6.15 p.m. for 6.45 p.m. when Mr. William Whitelaw, the Chairman of the London & North Eastern Railway, will preside.



## NOTES AND NEWS

**New Cocktail Lounge for the Felix Hotel.**—The L.N.E.R. is installing an attractively-appointed cocktail lounge at the Felix Hotel, Felixstowe.

**Pullman Car Co. Ltd.**—A petition has been presented to His Majesty's High Court of Justice for the confirmation of the reduction in capital of the Pullman Car Co. Ltd., from £1,250,000 to £237,500.

**The Hedjaz Railway.**—It is reported from Damascus that the Syrian and Saudi Arabian Governments have agreed to reopen the Hedjaz Railway. Since the war the southern terminus of the line has been at Maan, and the section thence to Medina has lain derelict.

**Extra Coach for Silver Jubilee.**—From March 7 an additional coach accommodating 35 passengers, will be included in the Silver Jubilee London-Newcastle streamlined express of the L.N.E.R. On this date, too, the regular silver coaches of the Silver Jubilee will return to service after undergoing their annual overhaul, during which time the spare set of blue Coronation stock has been used on the train.

**Another London-Glasgow Air Service.**—On April 11, North-Eastern Airways will introduce a daily service between Newcastle and Glasgow, connecting at Newcastle with the company's London-Perth route. Glasgow will thus have three air connections from London this year—two provided by Railway Air Services Limited (see our issue of February 18), and one by North-Eastern Airways.

**Speeding-up Traffic at Colwick, L.N.E.R.**—The gradient in the gravity sorting yard at Colwick (Nottingham), L.N.E.R., is to be slightly steepened at a cost of £2,600, in order to accelerate the speed of the wagons into the sidings. Thus, it is estimated to save the equivalent in time of 274 working days of eight hours each and effect a general speeding-up in the working of freight trains in the district. Colwick yard is the concentration point for traffic from all centres in the Nottingham area and particularly coal from the surrounding collieries, much of which is on its way to London. The turnover is between 4,000 and 5,000 wagons a day, or over a million a year.

**S.M.R. to Control Railways in North China.**—In spite of previous reports to the contrary, it now seems that Mr. Matsuoka, President of the South Manchuria Railway, has gained his objective with the Japanese Government, and over-riden all opposition, and that the new company to control all forms of transport in North China will be a subsidiary of the S.M.R. The latter will hold more than half the shares in the new venture, and provide most of the staff and technical assistance. As well as the railways, inland steamer and motor bus services and

control of the Shansi coal mines are included in the activities of the new company.

**Chinese Railways Ministry of Transport.**—Subsequently to reporting the amalgamation of the Chinese Ministry of Railways and Communications in our issue of February 18, it is learned that the style Ministry of Transport has been adopted for the combined ministries, and Mr. Chang Kia-NGau, former Minister of Railways, is the new Minister of Transport with headquarters at Hankow and a number of branches in various parts of the country. The Ministry has opened a Purchasing Commission at Pedders Buildings, Hong Kong.

**Passimeter Offices at Monkseaton and Whitley Bay.**—The L.N.E.R. is to provide a passimeter office on the up side at Monkseaton station, and an entrance and passimeter office on the up side at Whitley Bay. At the first-named station there is now an office where tickets for Newcastle may be obtained, but the new office will give bookings to all points. At Whitley Bay, the new entrance and office will enable passengers to enter the station direct from the up side during the daytime, instead of crossing a footbridge as at present. It is not intended to open the new entrance in the early morning and late evening or on Sundays. The work is to be put in hand forthwith.

**American Visitors at Southampton Docks.**—A party of American consular representatives and business men made a tour of Southampton Docks recently and was entertained to luncheon on board the Southern Railway steamer *St. Briac*. The party included:—

Mr. Harry E. Carlson and Mr. J. J. Coyle, Consul and Vice-Consul at the U.S. Consulate-General; Dr. Clifford C. Taylor, Agricultural Attaché, and Mr. John H. E. McAndrews, U.S. Dispatch Agent of the U.S. Embassy; Mr. W. A. Spencer, District Representative; Mr. N. S. Crockett, Executive Assistant; and Mr. L. E. Anderson, Legal Adviser to the U.S. Maritime Commission.

Others in the delegation were Mr. E. P. True (Baltimore and Ohio Railroad), Mr. D. R. Stuart (Bankers Trust Company), Mr. W. M. Treglown (Ingersoll-Rand Company), Mr. D. Gill (American Chamber of Commerce), Mr. A. Mosbacher (*Anglo-American News*), Mr. E. G. Gilmore (Underwood E. Fisher Limited), Mr. W. H. Chisholm (Illinois Central System), Mr. H. G. W. Cleave (Guaranty Trust Company), Mr. J. Dowrick (American Express Company), and Mr. A. King.

The party was joined at Southampton by Mr. Perry N. Jester, U.S. Consul. At luncheon, Mr. R. P. Biddle, Docks & Marine Manager, who presided, accorded a hearty welcome to the visitors and expressed thanks to the officials of the U.S. Consulate in Southampton for the help they had given in arranging the event. The speaker alluded to the natural advantages of Southampton. The docks, too, offered modern facilities in the shape of fruit auction rooms, cold storage, modern sheds, cranes, and

other equipment. The dock estate also possessed factory sites which had road, rail, and sea access—a feature which was not to be found everywhere. It seemed, in fact, that Southampton was the natural port for goods as well as passengers coming to Britain from the United States. Mr. H. E. Carlson, who responded, said he hoped that the efforts of the Southern Railway delegation to the U.S.A. would be to the company's benefit.

**Improved Refreshment Rooms, L.N.E.R.**—In pursuance of its "brighter station" policy, the L.N.E.R. will carry out extensive schemes of improvement during 1938 to the station refreshment rooms at Ipswich, Felixstowe, Finsbury Park, Hatfield, and Hitchin. New counters will be provided with modern fittings, up-to-date furniture, electric light fittings, and fireplaces; in all cases schemes of decoration will be chosen to make the rooms bright and attractive.

**Portsmouth-Jersey Air Service Reopened.**—The Jersey Airways service between Portsmouth and Jersey was reopened on February 28, the conditional stop at Portsmouth *en route* to and from Heston being introduced. One flight is scheduled daily in each direction, and connection is made at Portsmouth with Southern Railway electric trains. Cheap fares at mid-week and week-end tickets are issued by this route. Passengers' heavy luggage can be sent in advance by rail and steamer. Jersey Airways Limited has, during the last four years, carried more than 119,000 passengers. During 1937 alone, 33,300 passengers and nearly one million pounds of mail and freight were carried, involving over 800,000 flying-miles. All services in 1938 are being worked by four-engined, 14-seater aircraft.

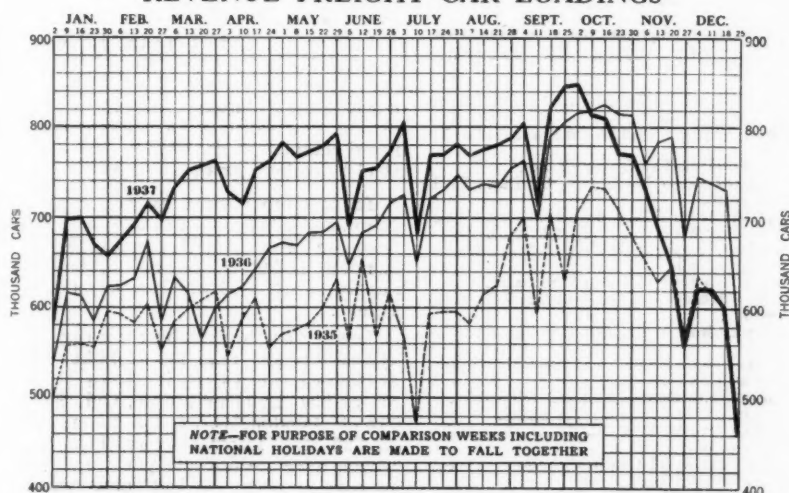
**Northern Ireland Transport Commission.**—As announced in our Personal columns this week, Viscount Craig-avon, Prime Minister of Northern Ireland, has now appointed Sir William M'Lintock as Chairman, and Sir Herbert Walker and Mr. J. S. Nichols as members of the Northern Ireland Transport Commission. The purpose of the commission is "To investigate and report on the working of the Road and Rail Transport Act (Northern Ireland), 1935, and to advise what improvements in the operation of the Act, or changes in its provisions, are necessary in order to secure on a sound economic basis an adequate and efficient transport system." The Northern Ireland Road and Rail Transport Act established a statutory Road Transport Board to take over all passenger and goods road services, including those which were at that time being operated by the railway companies. The railways have not obtained the benefit hoped for from the operations of the board, and requested an inquiry. The board itself has also requested an investigation, as many items of traffic formerly carried by the road transport undertakings which they acquired, have been discontinued or diverted to other means of operation.

## British and Irish Traffic Returns

GREAT BRITAIN	Totals for 8th Week			Totals to Date		
	1938	1937	Inc. or Dec.	1938	1937	Inc. or Dec.
L.M.S.R. (6,855½ mls.)						
Passenger-train traffic...	404,000	401,000	+ 3,000	3,091,000	2,996,000	+ 95,000
Merchandise, &c. ...	482,000	494,000	- 12,000	3,851,000	3,803,000	+ 48,000
Coal and coke ...	311,000	294,000	+ 17,000	2,483,000	2,309,000	+ 174,000
Goods-train traffic ...	793,000	788,000	+ 5,000	6,334,000	6,112,000	+ 222,000
Total receipts ...	1,197,000	1,189,000	+ 8,000	9,425,000	9,108,000	+ 317,000
L.N.E.R. (6,315 mls.)						
Passenger-train traffic...	265,000	267,000	- 2,000	2,056,000	2,015,000	+ 41,000
Merchandise, &c. ...	357,000	366,000	- 9,000	2,684,000	2,604,000	+ 80,000
Coal and coke ...	287,000	278,000	+ 9,000	2,277,000	2,115,000	+ 162,000
Goods-train traffic ...	644,000	644,000	-	4,961,000	4,719,000	+ 242,000
Total receipts ...	909,000	911,000	- 2,000	7,017,000	6,734,000	+ 283,000
G.W.R. (3,737 mls.)						
Passenger-train traffic...	162,000	163,000	- 1,000	1,285,000	1,270,000	+ 15,000
Merchandise, &c. ...	193,000	198,000	- 5,000	1,559,000	1,501,000	+ 58,000
Coal and coke ...	132,000	120,000	+ 12,000	1,016,000	956,000	+ 60,000
Goods-train traffic ...	325,000	318,000	+ 7,000	2,575,000	2,457,000	+ 118,000
Total receipts ...	487,000	481,000	+ 6,000	3,860,000	3,727,000	+ 133,000
S.R. (2,147 mls.)						
Passenger-train traffic...	262,000	258,000	+ 4,000	2,064,000	2,016,000	+ 48,000
Merchandise, &c. ...	63,500	65,000	- 1,500	464,500	466,500	- 2,000
Coal and coke ...	42,500	43,000	- 500	303,500	292,500	+ 11,000
Goods-train traffic ...	106,000	108,000	- 2,000	768,000	759,000	+ 9,000
Total receipts ...	368,000	366,000	+ 2,000	2,832,000	2,775,000	+ 57,000
Liverpool Overhead ... (6½ mls.)	1,311	1,162	+ 149	10,865	9,499	+ 1,366
Mersey (4½ mls.) ...	4,132	4,012	+ 120	34,888	33,567	+ 1,321
*London Passenger Transport Board ...	553,700	564,300	- 10,600	19,619,800	19,564,900	+ 54,900
IRELAND						
Belfast & C.D. pass. (80 mls.)	1,610	1,600	+ 10	13,409	13,009	+ 400
" " goods	507	616	- 109	3,459	3,741	- 282
" " total	2,117	2,216	- 99	16,868	16,750	+ 118
Great Northern pass. (543 mls.)	7,550	7,700	- 150	63,550	58,650	+ 4,900
" " goods	8,700	9,600	- 900	65,450	69,400	- 3,950
" " total	16,250	17,300	- 1,050	129,000	128,050	+ 950
Great Southern pass. (2,076 mls.)	26,753	25,134	+ 1,619	219,623	208,999	+ 10,624
" " goods	37,790	42,711	- 4,921	322,792	337,285	- 14,493
" " total	64,543	67,845	- 3,302	542,415	546,284	- 3,869

\* 35th week (before pooling)

## REVENUE FREIGHT CAR LOADINGS



Graph of revenue freight car loadings on U.S.A. railways during the years 1935-36-37. The sharp decline during the last quarter of 1937 will be noticed. Editorial comment on the trend of U.S.A. railway affairs during the past year appears on page 401

## British and Irish Railway Stocks and Shares

Stocks	Highest 1937	Lowest 1937	Prices	
			Mar. 2, 1938	Rise/Fall
G.W.R.				
Cons. Ord. ...	67½	55½	56½*	-1½
5% Cons. Prefce. ...	127	108	115½*	—
5% Red. Pref. (1950) ...	113	109	108½*	—
4% Deb. ...	113½	102½	108½	—
4½% Deb. ...	118	106	110½	—
4½% Deb. ...	124½	112	117½	—
5% Deb. ...	136½	122½	129½	—
2½% Deb. ...	76	64	68½	—
5% Rt. Charge ...	133½	118	127½	—
5% Cons. Guar. ...	133½	116½	125½*	—
L.M.S.R.				
Ord. ...	36½	25½	21½*	-1½
4% Prefce. (1923) ...	82½	65½	61*	-1
4% Prefce. ...	92½	77½	77*	-1½
5% Red. Pref. (1955) ...	107½	102	102	-1
4% Deb. ...	108	99½	102	—
5% Red. Deb. (1952) ...	117½	111	113½	—
4% Guar. ...	104	95½	100*	—
L.N.E.R.				
5% Pref. Ord. ...	12½	6½	6½	-1½
Def. Ord. ...	6½	3½	3½	-1½
4% First Prefce. ...	79½	63	61*	-1
4% Second Prefce. ...	31½	21	22*	-1
5% Red. Pref. (1955) ...	101½	89½	93½*	-1
4% First Guar. ...	103	91½	95	—
4% Second Guar. ...	97½	85½	87	-1½
3% Deb. ...	84½	74	76	—
4% Deb. ...	107½	98½	101	—
5% Red. Deb. (1947) ...	113½	106½	110½	—
4½% Sinking Fund Red. Deb. ...	110½	105½	107	—
SOUTHERN				
Pref. Ord. ...	98½	83½	78*	-1
Def. Ord. ...	27½	16½	19½*	-1½
5% Pref. ...	126½	105½	113½*	—
5% Red. Pref. (1964) ...	118	110½	113½*	—
5% Guar. Prefce. ...	133½	118½	125½*	+1½
5% Red. Guar. Pref. (1957) ...	118½	111½	114*	—
4% Deb. ...	112	101½	106	—
5% Deb. ...	135½	123½	127½	—
4% Red. Deb. ...	113	105	107	+1½
1962-67				
BELFAST & C.D.				
Ord. ...	5	4	4½	—
FORTH BRIDGE				
4% Deb. ...	106	99½	100½	—
4% Guar. ...	105½	99	100½	—
G. NORTHERN (IRELAND)				
Ord. ...	11	5	5½	-1½
G. SOUTHERN (IRELAND)				
Ord. ...	50	21½	23	—
Prefce. ...	61	34	33½	—
Guar. ...	94½	69½	70½	—
Deb. ...	95	82½	79½	-3½
L.P.T.B.				
4½% "A" ...	123½	110½	118½	—
5% "A" ...	135	121½	128½	—
4½% "T.F.A." ...	108½	104	106	—
5% "B" ...	125	114½	121½	—
"C" ...	99½	75	83½*	+1½
MERSEY				
Ord. ...	42½	22	23	—
4% Perp. Deb. ...	103	96½	100	—
3% Perp. Deb. ...	77½	74½	74½	—
3% Perp. Prefce. ...	68½	61½	63½	—

\*ex. dividend

## CONTRACTS AND TENDERS

The Vulcan Foundry Limited has received an order from the Bombay, Baroda & Central India Railway Administration, to the inspection of Messrs. Rendel, Palmer & Tritton, for one boiler required for XC class 4-6-2 type locomotive.

### Diesel Railcars for India

Ganz & Co. Ltd., through the Associated Electrical Industries (India) Limited, has received orders from the Indian Stores Department for a total of 11 diesel railcars to be supplied at a price of Rs.12,68,520, two spare power bogies at Rs.1,10,300 and spares at Rs.40,807, required for the N.W.R.

The Soc. Anglo-Franco-Belge de Matériel de Chemins de Fer, through James Clements & Co., has received an order for two bogie carriage underframes for the Morvi Railway, to be supplied to the inspection of Messrs. Robt. White & Partners.

Craven Bros. (Manchester) Limited has received an order from the Buenos Ayres Western Railway for one Craven external precision-grinding machine.

Dorman Long & Co. Ltd. has received an order from the Egyptian State Railways Administration for the supply of joists (Order No. 1.399, total cost approx. £297 f.o.b. Middlesbrough).

Monk Bridge Iron & Steel Co. Ltd. has received an order from the Buenos Ayres Great Southern Railway for 1,044 steel locomotive, carriage, and wagon tyres.

Beyer, Peacock & Co. Ltd. has received an order from the Bengal-Nagpur Railway Administration for one steel firebox, required for NM class locomotive.

The Bengal-Nagpur Railway Administration has also placed the following orders:—

Herbert Morris Limited: Two Morris cranes.  
Peter Brotherhood Limited: Crankshaft for air compressor.

B. & S. Massey Limited: One 20-cwt. steam hammer.

James Archdale & Co. Ltd.: One drilling machine.

Kryn & Lahy (1928) Limited: One piston ring hammering machine.

Murex Welding Processes Limited: One motor-driven arc-welding plant.

Alfred Herbert Limited: One sliding and surfacing lathe.

North British Locomotive Co. Ltd.: 18 steel crank axles.

Steel, Peech & Tozer has received an order from the Buenos Ayres Great Southern for 367 locomotive tyres.

The South Indian Railway Administration has placed the following orders to the inspection of Messrs. Robert White & Partners:—

Surahammer Brukes A.G.: 69 steel locomotive engine and tender tyres.

Banting & Tresilian Limited: 7,266 solid drawn steel boiler tubes.

Two of the five Fiat diesel trains to be put into service shortly by the Central Brazil Railway, states Reuters, have been delivered.

Richardson & Cruddas has received orders from the Indian Stores Department for a quantity of acute crossings.

The Associated British Machine Tool Makers Limited has received orders from the Indian Stores Department, for two Richards No. 1 size universal surfacing, boring, milling, drilling, and tapping machines.

### Wagons for Africa

The Gloucester Railway Carriage & Wagon Co. Ltd. has received an order from the Crown Agents for the Colonies for 20 bogie covered goods wagons required for the Gold Coast Government Railway.

Alfred Herbert (India) Limited has received orders from the Indian Stores Department, for one MacNab portable shockless, jarring, rollover, and pattern-drawing moulding machine; one universal oxygen cutting machine; two Lumsden No. 1 oscillating tool grinders; two Herbert No. 4 motor-driven capstan lathes; one Massey three-ton steam hammer; one Herbert No. 18U universal milling machine; one Kitchen & Wade high-speed radial drilling, boring, tapping, and studding machine; one belt-driven five-throw swaging and forging machine and one Norton cylindrical grinding machine.

The Gaekwar's Baroda State Railways Administration has placed the following orders to the inspection of Messrs. Rendel, Palmer & Tritton:—

Banting & Tresilian Limited: 1,400 steel boiler tubes, 16 steel flue tubes, and 12 steel arch tubes.

A.B.C. Coupler & Engineering Co. Ltd.: 24 sets of buffing and draw-gear for carriages and wagons, six locomotive buffers, and 12 coupling screws.

Vulcan Foundry Limited: Locomotive axle-boxes, cranks, wheels, and axles.

Hunslet Engine Co. Ltd.: Locomotive axle-boxes, cranks, and copper tubeplates.

John Spencer & Sons (1928) Ltd.: 98 laminated, 36 helical, and 30 volute springs.

Hurst, Nelson & Co. Ltd.: 130 pairs of wheels and axles and 110 wheel centres for carriages and wagons.

The Crown Agents for the Colonies have recently placed the following orders:—

Cargo Fleet Iron Co. Ltd.: Rails and fish-plates.

Brown, Bayley's Steel Works Limited: Steel tyres.

P. & W. MacLellan Limited: Steel.

Newport & South Wales Tube Co. Ltd.: Steel tubular poles.

Superheater Co. Ltd.: Superheater elements.

Allen West & Co. Ltd.: Switchboard.

Standard Telephones & Cables Limited: Telegraph equipment.

Bullers Limited: Telegraph ironwork.

Chas. Richards & Sons Ltd.: Telegraph ironwork.

Siemens Bros. & Co. Ltd.: Telegraph ironwork.

General Electric Co. Ltd.: Telephone apparatus; telephones.

Ericsson Telephones Limited: Telephones.

Copper Pass & Co. Ltd.: Tin ingots.

Metropolitan-Vickers Electrical Co. Ltd.: Transformers.

Thos. Firth & John Brown Limited: Tyres.

Steel, Peech & Tozer: Tyres.

A. Herbert Limited: Universal grinding machine.

Ward, Haggas & Smith Limited: Universal milling machine.

Murex Welding Processes Limited: Welding plants.

R. Johnson & Nephew Limited: Copper wire.

J. Sagar & Co. Ltd. has received an order from the Central Uruguay Railway Administration for one electrically-driven double vertical spindle moulding machine.

The Skoda Works have received an order from the Egyptian State Railways administration for the supply of axles (Ref. No. E.S.R. 21,765, total cost £361 delivery f.o.b. Hamburg or Trieste).

The Swedish State Railways Administration invites tenders, closing on March 15, for 500,000 kg. of engine oil for electric locomotives, 10,000 kg. of ordinary engine oil, 1,200,000 kg. of oils for coaches and trucks, and 130,000 kg. of cylinder oil of different kinds, learns Reuters Trade Service from Stockholm.

### Diesel Locomotive Required

Tenders are invited by the Director of Contracts, Army Headquarters, India, receivable by April 9, for the supply of a broad-gauge diesel locomotive required for the Defence Services in India.

Tenders are invited by the Egyptian State Railways Administration, receivable at the office of the Superintendent of Stores, Saptieh, Cairo, by April 2, for the supply of 39,170 vacuum brake rubber fittings.

Tenders are invited by the Chief Controller of Stores, Indian Stores Department (Engineering Section), New Delhi, for the supply of quantities of buffers and buffer parts required for the East Indian and North Western Railways.

Tenders are invited by the Chief Controller of Stores, Indian Stores Department (Engineering Section), New Delhi, receivable by March 21, for the supply of motion plates, horn blocks, and horn clips, required for the N.W.R.

Tenders are invited by the Chief Controller of Stores, Indian Stores Department (Electrical Section), New Delhi, receivable by March 24, for the supply of 20 sets of train-lighting dynamos, 100 amp. capacity.

Tenders are invited by the Director-General, India Store Department, Belvedere Road, Lambeth, London, S.E.1, receivable by March 11, for the supply of 155 tons of steel for making laminated coil and helical springs, and 1,200 steel tyres for carriages and wagons.

Tenders are invited by the Bengal-Nagpur Railway, receivable at 132, Gresham House, Old Broad Street, London, E.C.2, by March 16, for the supply of 13 H.S.M. class locomotive boilers.

Tenders are invited by the Bengal & North Western and the Rohilkund & Kumaon Railways, receivable by March 29, at 237, Gresham House, Old Broad Street, London, E.C.2, for the supply of 303 steel locomotive, carriage, and wagon axles; duplicate parts for locomotives; 6,120 helical and volute springs; 1,452 steel locomotive, carriage, and wagon tyres; 1,328 laminated and elliptical springs; 380 buffers and 2,000 hooks for locomotives, carriages, and wagons.



# OFFICIAL NOTICES

## Bengal-Nagpur Railway Company Limited

THE Directors are prepared to receive Tenders for:

3,700 STEEL PLANISHED PANEL PLATES. Specification and Form of Tender can be obtained at the Company's Offices, 132, Gresham House, Old Broad Street, London, E.C.2, on or after 25th February, 1938.

A fee of 10s. will be charged for each copy of the Specification, which is NOT returnable. Tenders must be submitted not later than Noon on Tuesday, 8th March, 1938.

The Directors do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right of reducing or dividing the order.

By Order of the Board,  
T. R. WYNNE,  
Managing Director.

## London Midland & Scottish Railway Company

NOTICE IS HEREBY GIVEN that a SPECIAL GENERAL MEETING of the London Midland & Scottish Railway Company will, in compliance with the Standing Orders of Parliament, be held at Euston Station, London, N.W.1, on Tuesday, the 15th day of March, 1938, at Twelve o'clock Noon precisely, for the purpose of considering and, if so determined, of approving the undermentioned Bills, namely:

**BILL PROMOTED BY THE COMPANY.**  
DEPOSITED IN PARLIAMENT

**LONDON MIDLAND & SCOTTISH RAILWAY BILL.**  
A Bill to empower the London Midland & Scottish Railway Company to construct works and to acquire lands; to amend the Superannuation Scheme of the Company; and for other purposes.

**BILL PROMOTED BY OTHER PARTIES.**  
DEPOSITED IN PARLIAMENT.

**BLACKPOOL IMPROVEMENT BILL.**  
A Bill to provide for the carrying into effect of an agreement between the Mayor, Aldermen and Burgesses of the Borough of Blackpool and the London Midland & Scottish Railway Company; to provide for the removal of the Blackpool Central Railway Station to another site in the said borough; to empower the said Mayor, Aldermen and Burgesses to execute street improvements and other works and to acquire lands; and for other purposes.

**JOSHIA CHARLES STAMP.**  
Chairman.

**OWEN GLYNNE ROBERTS.**  
Secretary.

Euston Station,  
London, N.W.1.  
28th February, 1938.

## Bengal-Nagpur Railway Company Limited

THE Directors are prepared to receive Tenders for:

13 H.S.M. CLASS BOILERS.

Specification and Form of Tender can be obtained at the Company's Offices, 132, Gresham House, Old Broad Street, London, E.C.2, on or after 1st March, 1938.

A fee of 20s. will be charged for each copy of the Specification, which is NOT returnable. Tenders must be submitted not later than Noon on Wednesday, 16th March, 1938.

The Directors do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right of reducing or dividing the order.

By Order of the Board,  
T. R. WYNNE,  
Managing Director.

## The Bengal and North Western Railway Company Limited

### The Rohilkund and Kumaon Railway Company Limited

THE Directors are prepared to receive Tenders for the supply of:

303 Steel Axles for Locomotives, Carriages and Wagons;

Duplicate Parts for Locomotives;

6,120 Helical and Volute Springs;

1,452 Steel Tyres for Locomotives, Carriages and Wagons;

1,328 Laminated and Elliptical Springs;

330 Buffers and 2,000 Hooks for Locomotives, Carriages and Wagons;

as per Specifications to be seen at the Company's Offices.

Tenders addressed to the undersigned, and envelope marked "Tender for Steel Axles," or as the case may be, with the name of the firm tendering, to be lodged not later than Noon on the 29th day of March, 1938.

For each Specification a fee of 10s. will be charged, which cannot, under any circumstances, be returned.

The Directors do not bind themselves to accept the lowest or any Tender.

By Order of the Board,  
J. WILLIAMSON,  
Managing Director.

237, Gresham House,  
Old Broad Street,  
London, E.C.2.  
28th February, 1938.

**RAILWAY TRACK SUPPLY FIRM** in need of Outdoor Assistant for work of comparatively simple nature are open to hear from applicants with Permanent Way experience. Appointment temporary in first instance.—Box No. 23, c/o THE RAILWAY GAZETTE, 33, Tothill Street, London, S.W.1.

## Bengal-Nagpur Railway Company Limited

THE Directors are prepared to receive tenders for:

302 STEEL TYRES FOR LOCOMOTIVES.

Specification and form of tender can be obtained at the Company's Offices, 132, Gresham House, Old Broad Street, London, E.C.2, on or after 3rd March, 1938.

A fee of 10s. will be charged for each copy of the specification, which is NOT returnable. Tenders must be submitted not later than NOON on Tuesday, 15th March, 1938.

The Directors do not bind themselves to accept the lowest or any tender, and reserve to themselves the right of reducing or dividing the order.

By Order of the Board,  
T. R. WYNNE,  
Managing Director.

## THE MADRAS & SOUTHERN MAHRATTA RAILWAY COMPANY LIMITED invite Tenders for:

340 STEEL TYRES FOR LOCOMOTIVES

(280 Metre Gauge and 60 Broad Gauge).

Specification and Form of Tender can be obtained from the Company's Offices, 123, Victoria Street, Westminster, London, S.W.1. Fee ONE GUINEA, which will not be returned.

Tenders must be submitted not later than 2 o'clock p.m. on TUESDAY, 22nd MARCH, 1938.

The Directors do not bind themselves to accept the lowest or any Tender and reserve to themselves the right of reducing or dividing the order.

By Order of the Board,  
G. W. V. DE RHE PHILIPPE,  
Secretary.

## Crown Agents for the Colonies

### COLONIAL GOVERNMENT APPOINTMENTS

APPLICATIONS from qualified candidates are invited for the following post:—

#### ASSISTANT ENGINEER

required for the Sierra Leone Government Railway for one tour of 12-24 months. Fixed salary ranging from £720 to £840 a year according to qualifications and experience. Free quarters and passages and liberal leave on full salary. Candidates not over 45 years of age, must have had considerable experience in steel work erection and should preferably have had charge of railway bridge construction under traffic.

Apply at once by letter, stating age, whether married or single and full particulars of qualifications and experience and mentioning this paper to the Crown Agents for the Colonies, 4, Millbank, London, S.W.1, quoting M/5535.

## RAILWAY AND OTHER REPORTS

**Isle of Man Railway.**—Receipts in 1937 were £50,625, an increase of £1,458, but expenditure was higher only by £350. Passenger revenue increased from £32,247 to £33,308, parcels from £5,217 to £5,299, and merchandise from £9,879 to £10,213. Train-mileage was 244,520, a decrease of 657, and 775,499 passengers were carried. Net revenue account stands at £6,934, out of which the directors recommend a dividend of 5 per cent. for the half-year to December 31 on the preference share capital, and of 2 per cent. on the paid-up ordinary share capital. A balance is left of £2,914, from which £1,000 is transferred to the reserve and renewal fund (£1,000 towards cost of further relaying the main line), and the balance is to be carried forward.

**Fishguard & Rosslare Railways & Harbours Company.**—Net revenue for the half-year to December 31 was £39,430, this being the amount provided under the guarantee of the Great

Western and Great Southern Railway Companies, after accounting for fees and expenses. Debenture interest takes £13,904, the dividend on the new guaranteed 3½ per cent. preference £21,659, and dividend on new 3½ per cent. preference 1914, £3,867.

**British Wagon Co. Ltd.**—After providing £45,279 (against £47,658) for interest charges, and £10,535 (against £8,033) for taxation, net profits for 1937 amounted to £37,518, as compared with £33,294 in 1936. A final dividend is proposed of 11½ per cent., the same as in the preceding year, with a bonus of 2½ per cent. (against nil), making a total distribution for the year of 22½ per cent. (against 20 per cent.). The reserve fund again receives £10,000 and the balance forward is increased from £23,286 to £28,867. The principal item in the balance sheet, "Wagons, locomotives, motors, rolling stock, and investments in British Government and other securities, less contingencies," account is reduced from £1,408,499

to £1,174,921, but deposit loans to the British Railway Traffic & Electric Company show an increase from £412,320 to £709,057.

**Birmingham Railway Carriage & Wagon Co. Ltd.**—The directors propose to amend the articles and to convert the 10,000 issued £10 cumulative preference shares and 990,975 issued £1 ordinary shares, into preference and ordinary stock, respectively. A meeting to consider the proposal was to be held yesterday (March 3). The results for 1937 were reported in these columns on February 25 last.

**Wagon Finance Corporation Limited.**—After providing for debenture and loan interest, and including the amount brought forward, there is £42,339 available, according to the report for 1937, against £41,489 for 1936. It is proposed to pay a final dividend of 7½ per cent., making 15 per cent. for the year (unchanged), together with a bonus of 2½ per cent. (unchanged). The amount to be carried to reserve is again £50,000, leaving a balance to be carried forward of £20,933, against £19,809.

## Railway Share Market

The stock and share markets have failed to retain the better tendency which developed last week. No heavy selling has been reported, but in most sections the gains established a week ago have been lost in the absence of further improvement in the volume of business. At this period of the year there is a disposition for buying orders to be withheld until after the Budget statement. At the present time there is also a general tendency to await further developments in international political affairs, as it is felt they may have an important influence on market sentiment.

Home railway stocks made lower prices, partly owing to the disappointing traffics for the past week, although the impression created by the statements at the annual meetings so far held is that, granted there is no serious set-back in trade conditions, there are reasonable prospects of dividends on the marginal stocks being maintained at the same rates as for 1937. Most of the ordinary and preference stocks are at

levels which offer apparently attractive yields, but for the time being the chief factor governing improvement in prices will probably be the surrounding trend of markets.

L.M.S.R. ordinary has been on offer and is now around 21½, pending the meeting, which is being awaited with considerable interest in the market. The 4 per cent. preference was also lower at 77½, as was the 1923 preference at 61. Great Western ordinary was lower at 56½ at which a yield of well over 7 per cent. is offered on the basis of last year's 4 per cent. dividend. Southern deferred, although lower on balance at 19½, had a relatively steady appearance, but the preferred was on offer and moved down to 78, although the yield offered must be regarded as attractive. With markets in their present inactive condition, however, and the possibility that prices may show further fractional losses pending a return of more normal conditions, questions of yield are not the main factor governing

sentiment. L.N.E.R. issues reflected the surrounding trend, including the 4 per cent. first preference which went back to 61 and the second preference, which made the lower price of 22. London Transport "C" was active around 83½.

Argentine Railway stocks held part of their recent improvement, although the movements this week have been adverse to holders. Reports of less satisfactory trade conditions in the Argentine were an adverse influence, but surrounding market conditions were the chief factor. Ordinary stocks were lowered, as were most of the preference stocks, although buyers were reported for Central Argentine 6 per cent. preference and B.A. Great Southern 5 per cent. preference. Debenture stocks of these railways and of the B.A. Western made better prices earlier in the week. Antofagasta and San Paulo were lower.

Canadian Pacific Railway issues were affected by the disappointing net earnings for January.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

Railways	Miles open 1937-38	Week Ending	Traffics for Week		No. of Weeks	Aggregate Traffics to Date			Shares or Stock	Prices						
			Total this year	Inc. or Dec. compared with 1937		Totals		Increase or Decrease		Highest 1937	Lowest 1937	Mar. 2, 1938	Yield % (See Note)			
						This Year	Last Year									
South & Central America	Antofagasta (Chili) & Bolivia	834	27.2.38	20,540	—	1,540	9	144,650	135,680	+	8,970	Ord. Stk.	29	101½	111½	Nil
	Argentine North Eastern	753	26.2.38	6,963	—	422	35	324,747	308,075	+	16,672	A. Deb.	191½	6	41½	Nil
	Argentine Transandine	—	—	—	—	—	—	—	—	—	—	6 p.c. Deb.	931½	60	80	5
	Bolivar	174	Jan., 1938	3,600	—	1,800	5	3,600	5,400	—	1,800	Bonds	91½	5	81½	57½
	Brazil	—	—	—	—	—	—	—	—	—	—	Ord. Stk.	17	9	81½	57½
	Buenos Ayres & Pacific	2,806	26.2.38	112,283	—	11,973	35	2,959,557	3,036,147	—	76,590	Ord. Stk.	171½	51½	51½	Nil
	Buenos Ayres Central	190	12.2.38	111,900	—	14,300	33	4,045,100	4,715,200	—	1670,100	Mt. Deb.	411½	18	111½	Nil
	Buenos Ayres Gt. Southern	5,084	26.2.38	209,801	—	19,293	33	5,104,465	4,980,415	+	124,050	Ord. Stk.	335½	131½	13	Nil
	Buenos Ayres Western	1,930	26.2.38	38,151	—	17,900	35	1,590,757	1,661,926	—	71,169	"	314½	114½	10	Nil
	Central Argentine	3,700	26.2.38	116,489	—	65,567	35	4,371,885	5,231,131	—	859,246	"	341½	105½	91½	Nil
	Do.	—	—	—	—	—	—	—	—	—	—	Divd.	201½	41½	51½	Nil
	Cent. Uruguay of M. Video	980	19.2.38	21,516	+	1,893	34	596,243	589,341	+	6,902	Ord. Stk.	673½	2	24½	Nil
	Cordoba Central	1,218	—	—	—	—	—	—	—	—	—	Ord. Inc.	61½	11½	1	Nil
	Costa Rica	188	Dec., 1937	31,844	+	12,491	26	155,206	110,934	+	44,272	Stk.	38	27	27½	71½
	Dorada	70	Jan., 1938	17,700	+	2,400	5	17,700	15,300	+	2,400	1 Mt. Db.	107	106	106	55½
	Entre Rios	810	26.2.38	13,858	+	998	35	506,931	459,855	+	47,076	Ord. Stk.	197½	6	5	Nil
	Great Western of Brazil	1,092	26.2.38	8,200	—	200	9	77,100	78,000	—	900	Ord. Sh.	5½	1½	1½	Nil
	International of Cl. Amer.	794	Jan., 1938	487,142	—	226,797	5	487,142	513,939	—	26,797	"	—	—	—	Nil
	Interoceanic of Mexico	—	—	—	—	—	—	—	—	—	—	1st Pref.	21	1/—	1/—	Nil
	La Guazira & Caracas	221	Jan., 1938	4,610	—	1,660	5	4,610	6,270	—	1,660	Stk.	81½	6	81½	Nil
Leopoldina	1,918	26.2.38	21,397	—	4,003	9	160,744	182,744	—	22,000	Ord. Stk.	91½	3	3	Nil	
Mexican	483	21.2.38	305,600	—	32,100	8	2,226,600	2,247,700	—	21,100	"	11½	1½	5½	Nil	
Midland of Uruguay	319	Jan., 1938	12,586	+	1,824	31	65,059	60,985	+	4,074	"	17½	1½	1½	Nil	
Nitrate	384	26.2.38	6,579	—	2,382	9	31,326	29,791	+	1,535	Ord. Sh.	311½	2	25½	Nil	
Paraguay Central	274	26.2.38	43,475,000	—	575,000	35	109,249,000	92,825,000	+	16,424,000	Pr. Li. Stk.	84	791½	761½	71½	
Peruvian Corporation	1,059	Jan., 1938	83,749	+	3,948	31	537,785	570,586	+	17,199	Pref.	145½	41½	5	Nil	
Salvador	100	19.2.38	24,500	—	16,000	34	664,375	683,008	—	37,633	Pr. Li. Db.	231½	21½	22½	Nil	
San Paulo	153½	20.2.38	26,400	—	7,746	8	223,053	220,409	+	2,644	Ord. Stk.	981½	56	52½	91½	
Taitai	160	Jan., 1938	6,291	+	2,705	31	28,830	24,490	+	4,340	Ord. Sh.	17½	11½	5½	139½	
United of Havana	1,353	26.2.38	52,977	—	3,968	35	735,721	726,222	+	9,499	Ord. Stk.	58½	11½	3½	Nil	
Uruguay Northern	73	Jan., 1938	1,072	+	20	31	6,372	7,616	—	1,244	Deb. Stk.	10	2	2	Nil	
Canada	Canadian National	23,803	21.2.38	638,632	—	60,430	8	4,597,830	4,863,334	—	265,504	—	—	—	—	5½
	Canadian Northern	—	—	—	—	—	—	—	—	—	4 p.c.	77	621½	691½	4	
	Grand Trunk	—	—	—	—	—	—	—	—	—	—	1017½	941½	100	4	
	Canadian Pacific	17,166	21.2.38	449,200	—	30,400	8	3,432,600	3,457,290	—	24,600	Ord. Stk.	18	71½	7	Nil
India	Assam Bengal	1,329	10.2.38	43,335	+	2,149	47	1,202,425	1,159,379	+	43,046	Ord. Stk.	86	731½	81	311½
	Barisi Light	202	31.1.38	4,342	+	1,485	45	114,712	96,037	+	18,675	Ord. Sh.	661½	46	89	81½
	Bengal & North Western	2,107	10.2.38	82,999	—	11,932	19	1,010,161	1,048,534	—	38,373	Ord. Stk.	317	301	303	315½
	Bengal Dooars & Extension	161	10.2.38	3,609	+	256	47	128,039	114,849	+	13,190	"	100	84	891½	611½
	Bengal-Nagpur	3,268	10.2.38	204,750	+	16,334	47	6,028,283	5,238,642	+	789,641	"	101	89	91½	48
	Bombay, Baroda & Cl. India	3,072	20.2.38	271,500	—	15,975	48	7,875,000	7,532,625	+	42,375	"	113	110½	111½	59
	Madras & Southern Mahratta	2,977	10.2.38	138,000	—	954	47	4,726,504	4,770,350	—	43,846	"	110	105	106½	8
	Rohilkund & Kumaon	571	10.2.38	18,175	—	2,977	19	191,159	202,187	—	11,028	"	314	302	308	315½
	South Indian	2,531½	31.1.38	130,385	+	7,147	45	3,504,179	3,357,583	+	147,176	"	103½	99½	101½	411½
Various	Beira-Umtali	204	Dec., 1937	90,397	+	21,605	13	276,730	206,068	+	70,662	—	—	—	—	—
	Egyptian Delta	620	31.1.38	8,371	—	106	45	224,688	214,343	+	10,345	Pr. Sh.	31/—	4	11½	Nil
	Kenya & Uganda	1,625	Jan., 1938	273,554	—	20,685	5	273,554	294,239	—	20,685	B. Deb.	461½	431½	471½	811½
	Manila	—	—	—	—	—	—	—	—	—	—	Inc. Deb.	98	99½	93½	41½
	Midland of W. Australia	277	Dec., 1937	15,204	+	401	26	84,334	82,054	+	2,280	—	—	—	—	—
	Nigerian	1,900	15.1.38	73,731	—	7,501	42	2,262,737	1,895,659	+	367,078	—	—	—	—	—
	Rhodesia	2,451	Dec., 1937	421,643	+	72,205	13	1,317,239	1,038,328	+	278,911	—	—	—	—	—
	South Africa	13,263	5.2.38	645,461	+	118	45	28,752,670	27,257,531	+	1,495,139	—	—	—	—	—
Victoria	4,774	Oct., 1937	804,019	—	79,904	17	—	—	—	—	—	—	—	—	—	

NOTE.—Yields are based on the approximate current prices and are within a fraction of 1%.

† Receipts are calculated @ 1s. 6d. to the rupee. ‡ ex dividend.

The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the Sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements are based on the current rates of exchange and not on the par value.

# Electric Railway Traction

## Great Western Electrification

THE prospect of the Great Western Railway electrifying its West of England main line from Taunton to Penzance is not the sort of project one would expect in this country, and it appears to have caused a good deal of surprise, particularly in view of what are generally regarded as more suitable areas for conversion to electric traction on other parts of the company's system. Nevertheless, there is much to be said for such a scheme, and, as Lord Horne, the Chairman, announced in his speech at the annual meeting on February 23, it is to be investigated by Messrs. Merz & McLellan, than whom none is more competent to come to a reliable conclusion. The conditions to be met on the Great Western west of Taunton include heavy gradients and numerous speed restrictions, calling for the high uphill speeds and quick acceleration characteristic of electric traction. In summer the traffic is very heavy and at other times of the year the line is liable to be called upon to deal with rushes of special traffic, as, for example, flowers and vegetables from the Scilly Islands. There are numerous branch lines which presumably would not all immediately be electrified, and, in order to obtain the maximum saving, consideration will no doubt be given to working these by means of diesel power, so that the expense of maintaining steam locomotive depots might be eliminated. In considering this project, it is interesting to recall the experience of the Swedish State Railways, on which electrification was found to give very substantially greater practical economies than had been expected, with the result that conversion from steam to electric traction has been extended on a much wider scale than was originally proposed, and always with increasing benefit, not only in economy but in improved traffic facilities.

## Further Electrification in Austria

SINCE the war, the 196-mile Vienna—Salzburg line has formed part of the chief trunk route of the Austrian railway system, for the partition of the old Austro-Hungarian Empire resulted in the main traffic flow of what is modern Austria being changed from a north-south to an east-west direction. The Vienna—Salzburg line, in conjunction with the Arlberg route, carries the international trains to and from Switzerland, which country is itself the clearing house for Western European traffic, and over it run also the Vienna—Bavaria—Rhine trains as between Vienna and Wels. The total traffic over the line has been estimated at 2,332 million tonne-km. gross a year; of this amount 56 per cent. is represented by freight traffic, and over 60 per cent. of the whole is made up of international trains. Last year the total traffic of the Austrian Federal Railways increased considerably, and the Vienna—Salzburg line contributed its full share to the increment. Proposals to electrify this line have been made several times, but last year a start was made, working eastward from Salzburg. The first section, 43 miles, from Salzburg to Attnang—Puchheim, where a junction is made with the

electrified Salzkammergut line, is to be opened to electric traction with the inauguration of the winter timetables in October next. The second section, from Attnang—Puchheim to Linz, will be turned over to electric traction a year later. The westernmost section is the most difficult, and has grades up to 1 in 90, with a sharp rise beginning at Salzburg station. The easternmost division, from Linz to Vienna, 118 miles, is to be completed by 1941. Including all civil engineering works (foremost of which is the complete rebuilding of Linz station), the enlargement of the Spüllersee hydro-electric plant, and the provision of locomotives, the estimated cost is almost 80 million Austrian schillings (£3,150,000). The estimated yearly energy consumption over the whole 196 miles from Salzburg to Vienna is about 96 million kWh., of which 60 to 70 million will come from the Spüllersee station; the remainder will be obtained from power transmission networks in the neighbourhood of Vienna. The consumption of the electrified lines west of Salzburg is about 145 million kWh. a year. The extension of the Spüllersee plant is already well under way, and much of the heaviest machinery, weighing up to 70 tons a piece, has reached the site; the transport of this material over the mountain roads from the railway presented something of a problem.

Eighteen new electric locomotives have been ordered, viz., eight for express trains and ten for passenger and freight trains. For the second type of duty the standard Austrian Bo + Bo locomotive of Class 1170.200 has been chosen. For express duties it was not desired to perpetuate the Austrian standard 1-Do-1 locomotive of Class 1670, which has four vertical traction motors. Although this class has given a good deal of satisfaction in express working on the mountain lines west of Salzburg, the driving axle life has not been all that was desired, and, further, the higher speeds over greater distances which the characteristics of the Vienna—Salzburg line permit, could be met better by some change in the mechanical portion design. In order to get high-power locomotives as quickly as possible, and without any necessity for a trial period, the German State Railway's 2-Do-1 locomotive of Class E.18 was chosen as a model, and modifications made to suit Austrian conditions. The one-hour rating is in the neighbourhood of 4,500 h.p., and the maximum short-time output is over 6,000 h.p. The mechanical portions of the locomotives are being built at the Floridsdorf works, and the electrical equipments are being supplied by the Austrian A.E.G. and Austrian Siemens-Schuckertwerke. The construction of the overhead line, carrying 15-kV. 16⅔-cycle single-phase current, is of the present standard type. It is probable that when the Vienna—Salzburg route has been converted, the line from Vienna to the Hungarian frontier at Hegyesalorn, and the line connecting the East and West stations in Vienna, will be electrified. After that, the Semmering line is scheduled for conversion, thus resuscitating propositions made in 1927-28. At the moment, the bridges and track of the Semmering route are being strengthened, and when conversion actually takes place, will be able to carry the 20-ton axle loads allowed on the Salzburg line in place of the present restriction to 15 tons.



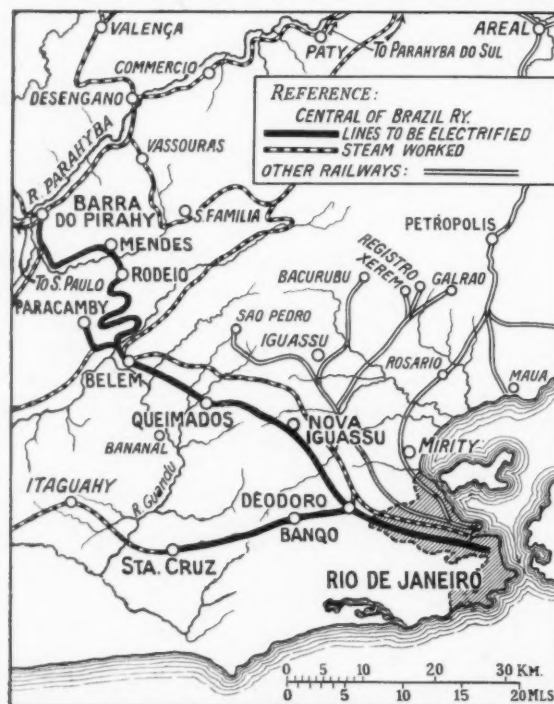
## ELECTRIFICATION OF THE CENTRAL RAILWAY OF BRAZIL

*Dense short-distance service now operating out of Rio de Janeiro forms first part of £3,000,000 conversion scheme embracing main and suburban lines of 5 ft. 3 in. gauge*



Six-car electric train near Rio de Janeiro

THE electrification of the main line of the Central Railway of Brazil from Rio de Janeiro to Barra do Pirahy, with the branches from Deodoro to Santa Cruz and from Guedes da Costa to Paracamby, is being



Map showing location of electrified routes

actively pursued by the Metropolitan-Vickers Electrical Co. Ltd. The first public electric train service on the suburban section began on July 10 last year, and the whole of the suburban traffic out to Madureira (10½ miles) is now operated by electric multiple-unit trains. It was in March, 1935, that the electrification contract was signed, and in the financing of the scheme Metro-Vick worked in co-operation with the Export Credits Department of the Board of Trade.

As far back as 1904 the necessity of electrification was ventilated, and since November 7 of that year, administrative measures, projects, and decrees, intended to make the electrification an accomplished fact, have succeeded one another almost uninterruptedly up to the present time. In 1907, Dr. Aarao Reis, manager of the railway, stated in his report that the electrification of the suburban trains was urgent and necessary. In 1912 the Engineer, Dr. Paulo de Frontin, reminded the Government of the necessity of putting in hand the project which depended on approval by Congress. The year 1919 saw the Government authorised by law No. 3674, of January 7 to make the necessary studies, acquire the necessary material, and establish electric traction on the Central, but it was only on November 29, 1921, under the Assis Ribeiro administration, that the first tenders were made. Curiously enough, the Metropolitan-Vickers Electrical Co. Ltd. was amongst the four firms to compete, without result at that time. In 1923, after the failure of the 1921 project, the new manager, Dr. Carvalho Araujo, insisted with the Government on the electrification which the congested steam train service made day by day more necessary.

A loan of 25 million dollars, floated on this occasion, represented the most important attempt made by the old Republic to satisfy the long standing aspiration of the Rio and suburban population, but once again the attempt was doomed to failure. A period of eight years followed,

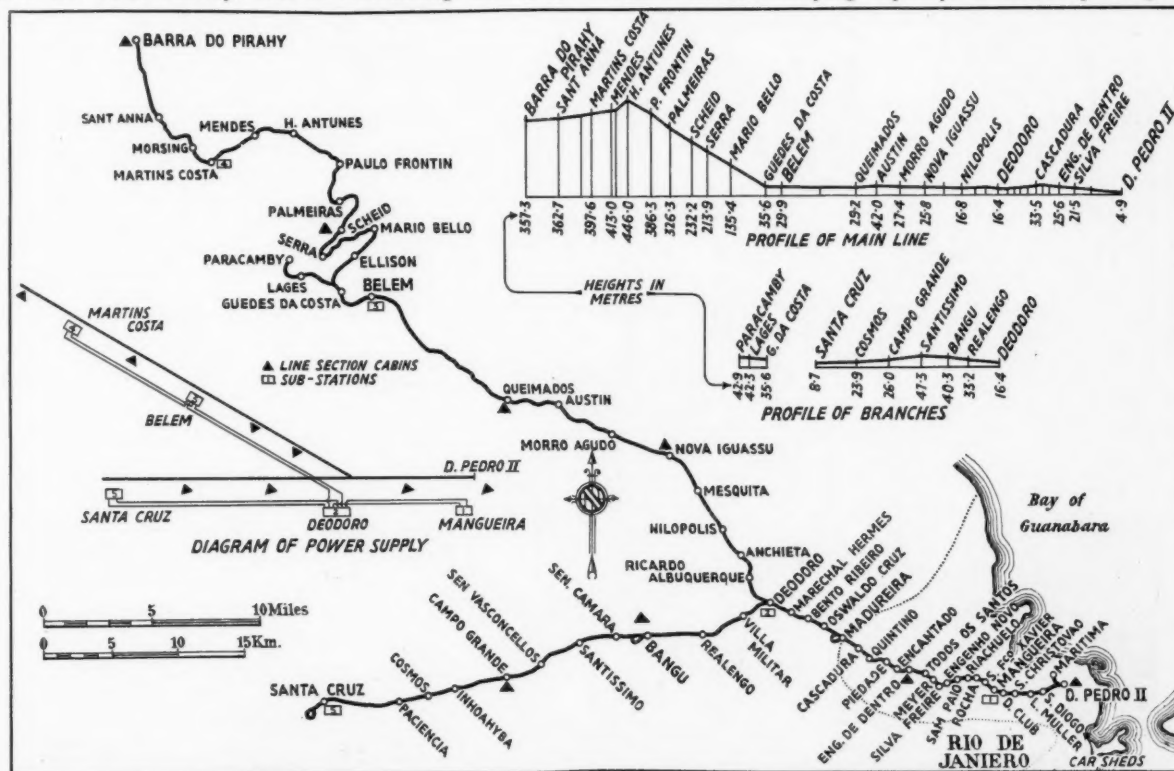
in which the governing bodies abandoned any attempt to solve the problem, and the suburban passengers continued to suffer the discomfort and inconvenience of a totally inadequate steam-train service. Passengers travelling on top of coaches, on engine tenders and footboards; passengers riding on buffers, and hanging on to door handles were common sights during the rush hours on the Rio suburban trains, which were always dangerously overloaded. The necessity of electrification was made evident by the increase in the number of suburban passengers from 12 millions in 1900 to 63 millions in 1934, an increase of 425 per cent.; train-km. increased from 721,000 in 1900 to 3,857,000 in 1934, an increase of 435 per cent. Against such differences the number of passenger coaches had increased only by 72 per cent.—from 160 to 275. Apart from the fact of the coaches being inadequate for such a movement, their construction, with only single doors at the ends, was totally unsuitable for the quick loading and unloading of passengers.

At the time the conversion contract was signed the Central Railway comprised 3,142 km. (1,950 miles) of route on three different gauges, but 40 per cent. of the whole traffic on the 1,262 route km. (780 miles) of 5 ft. 3 in. gauge line was over the 147 km. (91.5 miles), between Rio de Janeiro and Barra do Pirahy and from Deodoro to Santa Cruz. It was realised that once congestion was relieved on this part of the line, the result would be felt over the whole railway, and in remodelling the service



Dom Pedro II terminus at Rio de Janeiro

it was also obvious that choice should fall on the system which technically and economically satisfied not only present but also future requirements, by amplifying, and not substituting, the existing installation. No other system offered the same elasticity as electrification, as with trains composed of six coaches (two train units) with a capacity of 1,280 passengers, and a three-minute service over the four tracks which exist between Rio and Deodoro, 40 trains an hour could be run in each direction and 51,200 passengers carried. Under the system of steam traction, even at rush hours only 15 trains an hour were possible, with a normal carrying capacity of 16,000 passengers,



Map of electrified lines showing positions of substations, which are numbered in box form

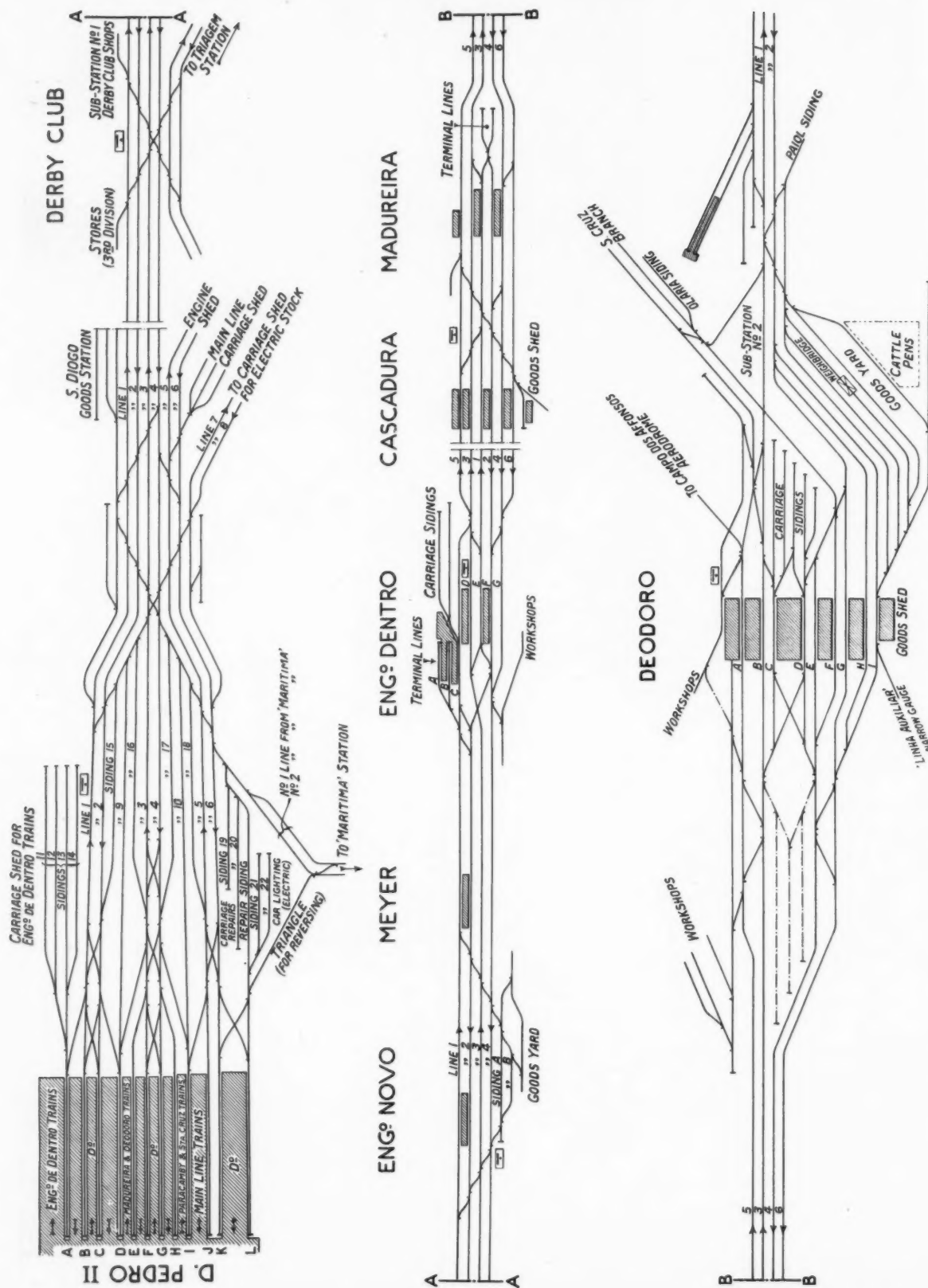


Diagram of electrified tracks of the Central Railway of Brazil from Dom Pedro II terminus, Rio de Janeiro, to Deodoro, 14 miles



calculated at 150 passengers a coach, which meant that the number of passengers travelling on footboards, platforms, roofs, and engine tenders, was enormous. Future expansion could be dealt with, under the electrification, by the simple addition of three-coach train units, thereby increasing the capacity immediately by 50 per cent. to 76,800 passengers, which could be still further increased if necessary, as although studies had been based on an average of 3.5 passengers to the square metre, it was known that in Europe and the United States the average was 5.5. If this average were adopted, each coach would accommodate 120 more passengers and each train of nine coaches, 1,080, so that during the rush hours the total increase could be 43,200, making it possible to transport 120,000 passengers an hour in any one direction, a number which it was not likely would be attained having in mind the possibilities of the zone served.

Amongst other considerations, those referring to fuel were not least important. Coal, oil, and firewood cost the Central Railway an average of 36,232 contos a year from 1925 to 1929, and in the same period, annual fuel costs for the Rio-Barra do Pirahy-Santa Cruz lines averaged 14,728 contos, or 40 per cent. of the total. Not less important was the fact that the transport of coal to the various depots in 1929 represented 12 per cent. of the total transport of the railway, occupying 13,070 wagons, and 1,188 trains with an average haul of 264 km. (158 miles). In addition, apart from these wagons being virtually lost to remunerative traffic, the running of such trains cost 1,300 contos a year in fuel, lubricants, and staff. Finally, the cost of loading and unloading coal to and from the wagons, as also loading the engines, entailed 250 workmen at a yearly cost of between 900 and 1,000 contos of reis. Notwithstanding that a great number of the suburban engines consumed oil fuel, not included in the preceding statistics, 30 per cent. of the railway's coal consumption took place on the lines contemplated by the electrification scheme.

From details contained in the report of the Minister of Transport on the subject, it was observed that the annual cost of steam traction over the lines coming under the electrification scheme, amounted to 31,343 contos (a later and more accurate estimate gave this as 32,852 contos), and the cost of electric traction was calculated at 17,254 contos, giving a difference of 14,089 contos. Adding to this the sum of 2,000 contos expected from the increased number of passengers, the balance in favour of electrification went up to 16,089 contos susceptible of further increase to 23,000 contos if all fares were raised 100 reis, which measure could be termed reasonable, in view of the general improvement in the service. It was clear, therefore, that the balance of 23,000 contos would pay off in a few years the total cost of electrification which had been estimated at £2,878,733 plus 7,494 contos local currency, and it had to be remembered that an immediate expenditure of 80,000 contos in the acquisition of new locomotives

and coaches was absolutely indispensable if steam traction continued. No doubt could remain, therefore, as to the choice to take, and the electrification of the broad gauge lines between Rio de Janeiro, Santa Cruz, Paracamy, and Barra do Pirahy, including the Rio stations of Maritimo and São Diogo, as well as the main Dom Pedro II terminus, was finally contracted in 1935 with Metropolitan Vickers at a cost of 180,218 contos in accordance with decrees numbered 22,722, 24,238, and 24,614 dated 7/6/33, 14/5/33, and 7/7/33 respectively.

With the railway suffering large yearly deficits, and the State treasury seriously depleted after the revolution of 1930, the financing of the electrification required careful study. A loan, with its inevitable preliminary and intermediary charges, as also for interest, together with its probable influence on exchange, was impracticable, and it was finally decided that payments should be spread over a long period in instalments more or less proportionate to the work executed. For this purpose the scheme was divided into two parts, namely, the electrification from Dom Pedro II station to Nova Iguaçu and Bangü, and including car sheds and offices, satisfying 93 per cent. of the suburban transport, at a cost of 91,874 contos, and then completion to Barra do Pirahy and Santa Cruz at a cost of 88,344 contos.

Among the indirect advantages of the complete electrification scheme will be the release of 127 locomotives and 299 coaches, and it will be possible to relieve considerably the congestion prevailing on the suburban stretch of the Auxiliar line, once the gauge is widened up to São Matheus. (This work is already in hand.) In turn, this will allow the transfer of narrow-gauge material to the Rio d'Ouro branch, which also is badly equipped, and the São Paulo and Bello Horizonte suburban services would be improved by the addition of more rolling stock. Badly worn and out-of-date stock on interior mixed and express trains will be replaced, and finally the remaining engines released will be more than welcome for freight traffic.

### Traffic

As regards the suburban services, there are two up and two down tracks between Dom Pedro II and Deodoro, 23 km. (14½ miles), and the suburban stopping trains will be run on the slow tracks. Proposals have already been made to add fifth and sixth tracks between São Diogo and Engenho de Dentro. The daily service now consists of 267 down and 268 up trains between Dom Pedro II and Engenho de Dentro of which about 200 go on to, or come in from, Madureira. At first, a service of 255 trains a day was worked until all the necessary train units were delivered. The standard times for the stopping trains are 20 min. to Engenho de Dentro and 33 min. to Madureira, contrasted with steam-train times of about 32 min. and 45 min. respectively; when the electrification is complete it is proposed to run certain trains express to Madureira and stopping thereafter to

TABLE I.—DISTRIBUTION OF RIO SUBURBAN TRAFFIC, CENTRAL RAILWAY OF BRAZIL

	Per cent.
Rio to Engenho de Dentro (Km. 12)	25.0
Engenho de Dentro to Madureira (Km. 17)	41.0
Madureira to Deodoro (Km. 22)	13.0
Deodoro to Nova Iguaçu (Km. 35)	8.5
Nova Iguaçu to Paracamy (Km. 70)	1.0
Deodoro to Bangü (Km. 31)	8.5
Bangü to Santa Cruz (Km. 56)	6.0

TABLE II.—DISTRIBUTION OF RIO SUBURBAN TRAFFIC ON TIME BASIS

	Per cent.
12.0 midnight to 4.0 a.m.	2.5
4.0 a.m. to 8.0 a.m.	25.8
8.0 a.m. to 12.0 noon	14.7
12.0 noon to 4.0 p.m.	14.4
4.0 p.m. to 8.0 p.m.	32.9
8.0 p.m. to 12.0 midnight	9.7

TABLE III.—DISTANCES FROM DOM PEDRO II TERMINUS, RIO. KM.

D. Pedro II	—	Deodoro	23	Martins Costa	97
Lauro Muller	3	R. Albuquerque	25	Morsing	99
S. Christovão	4	Anchieta	27	Sant'Anna	103
Derby Club	4½	Nilopolis	29	Batta do Pirahy	109
Mangueira	5½	Mesquita	32	SANTA CRUZ BRANCH	
S. Fc. Xavier	6	Nova Iguaçu	36	Deodoro	23
Rocha	7	Morro Agudo	40	Villa Militar	25
Riachuelo	7½	Austin	45	Cel. M. Bastos	26
Sampaio	8½	Queimados	49	Realengo	28
Engenho Nobo	9	Caramujos	57	Bangü	32
Meyer	10	Belém	62	Senador Camará	34
Todos os Santos	11	Guedes da Costa	65	Santissimo	36
Engenho de Dentro	12	Ellison	69	Sen. Vasconcellos	40
Encantado	13	Mario Bello	71	Campo Grande	42
Piedade	14	Serra	76	Inhoabyba	46
Q. Bocayuva	15	Scheid	78	Paciencia	50
Cascadura	16	Palmeiras	83	Santa Cruz	55
Madureira	17	Paulo Frontin	86	PARACAMBY BRANCH	
Oswaldo Cruz	19	H. Antunes	90	Belém	62
Prof. B. Ribeiro	20	Parada Mendes	92	Lages	68
M. Hermes	21	Mendes	93	Paracamy	71

Deodoro in 25 to 28 min.; and other multiple-unit trains will go beyond Deodoro, some going down the main line to Nova Iguaçu and others down the Santa Cruz line as far as Bangú, but when the whole scheme is complete they will be prolonged to Paracambi and Santa Cruz respectively.

The distribution of the Rio suburban travellers on the Central Railway of Brazil corresponds to the percentages given in the accompanying Table I. The great majority of passengers travel into Rio in the morning and back at night, when the headway is 5 min.; there is a relatively small passenger traffic between the suburban stations down the line. The distribution of the traffic during the day is shown in Table II, the percentages given covering both up and down traffic; the greatest peaks are from 6.00 to 8.00 and from 17.00 to 19.00. Fares have been raised on the section from Rio to Madureira, the reasons being the better service given and the desire to pay off the cost of conversion as soon as possible. Increased fare scales will come into operation in the outer suburban area as electrification is extended outwards. It is proposed to abolish ordinary return fares, and to issue monthly contract tickets for business hour travellers.

The main-line passenger trains under the present first stage of electrification will continue to be steam hauled, but when the second stage is finished express electric locomotives will be used to Barra do Pirahy, and the freight trains also will be electrically hauled from the Maritima yard. Maximum loads have been fixed at 500 tons for passenger trains and 1,000 tons for goods trains.

#### Conversion

The contract signed with Metro-Vick provided for the conversion of 147 route km. (91.5 miles) equivalent to about 334 track km. (207 miles). The system adopted is 3,000 volts d.c. with overhead current collection. The contract included the main step-down plant; transmission lines from there to the substations; all substations and equipment; track sectionalising cabins; overhead line equip-

ment; multiple-unit trains; electric locomotives; supervisory remote control; electric automatic signalling and point operation; car storage sheds; workshops and machine tools for the repair of the rolling stock; and office accommodation for the staff of the Electrical Department, the chief of which is Dr. Benjamin do Monte, to whom, along with the General Manager of the Central Railway, Colonel Mendonça Lima, we are indebted for facilities to inspect the line and equipment and to gather material for this article.

The principal subcontractors to the Metropolitan-Vickers Electrical Co. Ltd. are:—

British Insulated Cables Limited, for overhead line and transmission.

British Thomson-Houston Co. Ltd., Rugby, for the rectifier units and high-speed circuit breakers.

General Railway Signal Co. Ltd., for the signalling installation, manufactured by Metro-Vick.

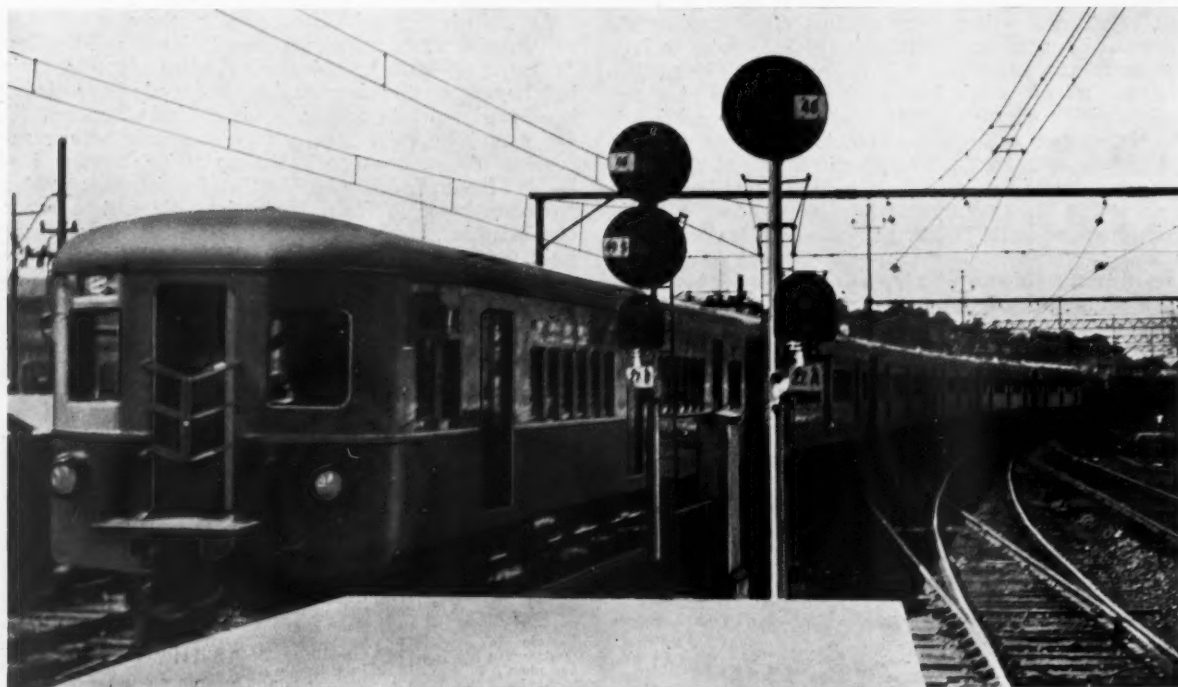
Metropolitan-Cammell Carriage & Wagon Co. Ltd. for the coach bodies, underframes, and bogies.

In addition, building contracts were placed with Brazilian firms in Rio de Janeiro. The car sheds and offices are at São Diogo, and the repair shops at Deodoro. The repair works consist of the usual bays for the electric coaches and locomotives, and are equipped with overhead cranes, and a machine shop containing ordinary lathes, wheel lathes, drilling and milling machines, and the wood-working machinery for ordinary repairs to the stock.

#### Power Supply and Distribution

It is the ultimate intention to take a supply of power at 80 kV. three-phase 50 cycles at a main step-down station at Deodoro (the centre of energy distribution), where it is to be transformed to 44 kV. for distribution to five substations, but for the purpose of the first stage, power at 25 kV. three-phase 50 cycles is being fed direct to substations Nos. 1 and 2 (Mangueira and Deodoro), the equipments being so designed as to connect for either 25 kV. or 44 kV.

The main step-down station is of the outdoor type and



Six-car train composed of two three-car sets coupled in multiple-unit



*Metro-Vick high-speed circuit breaker*

consists of three transformer units each of 17,500 kVA., with the corresponding 80 and 44 kV. switchgear apparatus, it being the intention that one of these units shall serve as a standby. These transformers feed into the 44 kV. busbar from which circuit breakers control three outgoing double-circuit transmission lines following the railway route and feeding their respective substations. Deodoro substation also takes its power from this busbar. The substations thus supplied with power are to be located at Mangueira (now in use), Deodoro, Belém, Martins Costa, and Santa Cruz, numbered respectively 1, 2, 3, 4, and 5. The first four will each be equipped with three 2,500 kW. rectifier units, one being normally in reserve, and No. 5 will have only two such units, one of which is again normally in reserve. One of these B.T.-H. rectifiers is illustrated here.

The converter apparatus, comprising steel tank mercury arc rectifiers with their transformers, converts the incoming 44 kV. supply to 3,000 volts d.c. This converter apparatus is complete with all the necessary auxiliary equipment which takes power from either one or other of a pair of auxiliary transformers, the switches being suitably interlocked. The rectifiers are equipped with separate re-coolers for the main circulating water, and the d.c. output is smoothed by the use of resonant shunts and condensers to minimise interference with communication circuits. The substations have outdoor transformers, auxiliary transformers, and 44 kV. switchgear, but the rectifiers and control equipment are housed inside the building. The rectifiers supply power to the d.c. busbar, each equipment being protected with a reverse-current high-speed circuit breaker.

The overhead wire is fed from the 3,000-volt d.c. busbar through high-speed circuit breakers which also serve to sectionalise the line at that point. The line is to be sectionalised further at various points between substations by track-sectionalising cabins containing high-speed circuit

breakers. The complete scheme comprises metering equipment at the Deodoro main step-down substation which will enable records to be made of the total power consumed by the system. The equipment also provides for measuring the power input to each individual substation.

For the purpose of supplying signalling power to the system, duplicate 44/4.4 kV. single-phase, 50-cycle step-down transformers, one of which is a standby, are being installed at every substation. The transformer feeds the 4,000-volt single-phase overhead transmission line which is tapped where required and connected to pole-mounted transformers to reduce the tension to 110 volts for signal purposes.

#### Remote Control

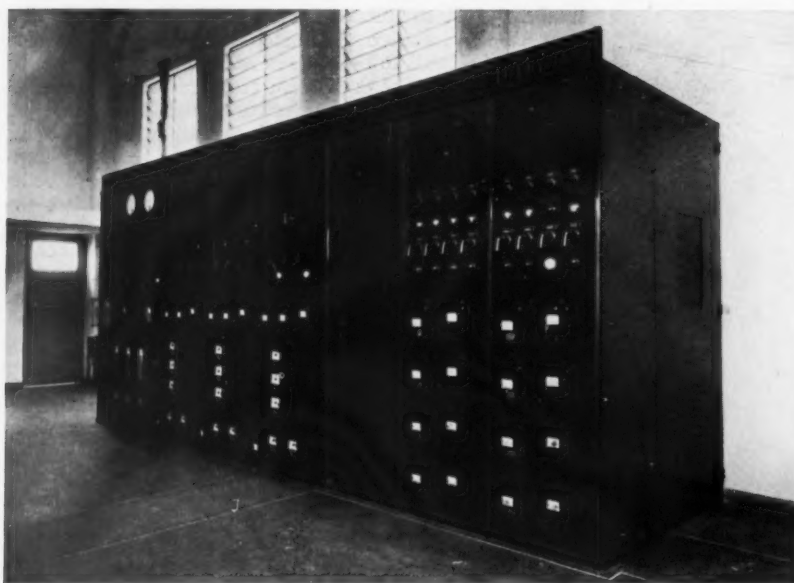
The energy supplied to the system, and the operation of all a.c. circuit-breakers, rectifying apparatus and d.c. feeder and sectionalising breakers is being remotely-controlled from a central control room situated adjacent to the Deodoro substation. By this means the distribution and switching of the whole of the electrified system is completely under the control and supervision of the operator at Deodoro. For the purpose of supervision and control a diagram is installed in the control room to show the layout of the electrified tracks, and to represent the three-phase transmission lines, rectifier substations, overhead contact lines, and sectionalising cabins, and to show all the a.c. and d.c. switches and feeder lines which it is intended to control centrally. This diagram incorporates a control board on which the operator manipulates the necessary keys for the desired operation of switches on any part of the system.

Remote control and indication is provided for all the a.c. oil switches and the d.c. high-speed feeder breakers.



*Close-up view of B.T.-H. 2,500 kW. rectifier*





*Rectifier control panel in one of the remotely-controlled substations on the first section of the Central Railway of Brazil's main line and suburban electrification scheme*

Remote indication only is provided for the rectifier breakers as these function automatically when the conditions are correct. Hand-set indicators are provided for the manually-operated a.c. isolating switches, since these can only be operated under exceptional conditions by the system operator, who then sets the indicators to their corresponding positions.

Remote indication of the summated a.c. load on each substation is provided. An indication of low battery voltage in any substation is given by an audible alarm which also is used to inform the operator of the automatic opening of any switch under his control. A similar desk type control panel is provided for purposes of signal power supply. The rectifiers themselves are designed for fully automatic operation, following remote controlled initiation. Each substation and track cabin is equipped with storage battery and charging plant for supplying control circuits and for lighting, &c.

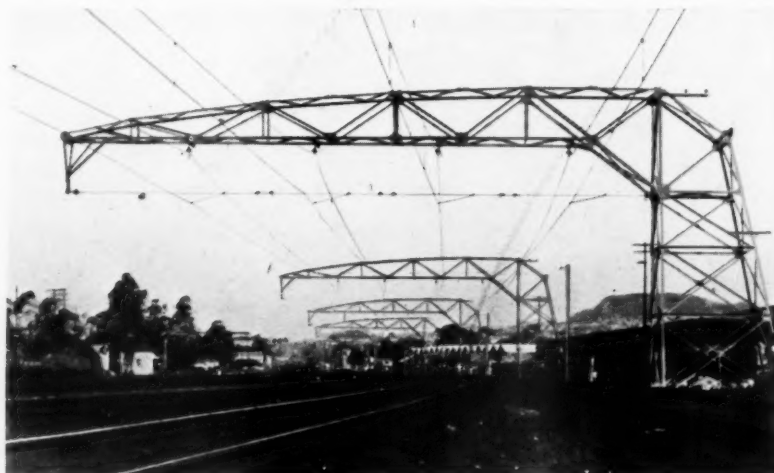
#### Overhead System

The overhead construction provides for the equipment of 334 track km. (207 miles). The railway between Dom Pedro II and Deodoro has four main running tracks, and runs through a thickly-populated area. From Deodoro to Belém there are two main running tracks, and from

Belém to Barra do Pirahy there is a Sierra section with two tracks through tunnels, cuttings, and embankments having severe grades and curves of a minimum radius of 140 metres (460 ft.).

The equipment for all lines consists of a single grooved copper contact wire of 125 sq. mm. (0.20 sq. in.) section, suspended by means of flexible droppers from a single catenary wire, which is of copper for the main tracks and of galvanised steel for secondary lines. The total copper section, including messenger wire, is 225 sq. mm. (0.36 sq. in.) per track from Dom Pedro II to Deodoro; from Deodoro to Barra do Pirahy and to Santa Cruz it is 250 sq. mm. (0.40 sq. in.). The catenary is supported by means of disc insulators suspended from steel supporting structures. The contact is registered at structures by means of short register arms carried on a cross span, and on sharp curves a pull-off from a single mast at mid span is used to locate both the catenary and contact wires instead of an additional supporting structure.

The supporting masts carry, where required, in addition to the overhead track equipment, a double-circuit three-phase supply at 44 kV. to the substations, a single-phase 4.4 kV. power supply for signalling purposes, and a continuous earth wire for structure bonding. The steel structures are of two types. Those for two to four tracks are



*Cantilever form of overhead construction carrying the 3,000 volt contact wires and catenaries of four tracks in the neighbourhood of Rio de Janeiro*

built up of broad-flange beams, and the masts grouted into cored holes left in the concrete foundations; for multiple-track construction, and for anchoring structures, British Standard sections are used and the masts fixed on foundation bolts set in the concrete foundations.

The catenary and contact wires are rigidly anchored at each end of tension lengths of approximately 1.6 km. (one mile). On main tracks the equipment is sectionalised by means of switches mounted on the structures at overlap spans, at the end of the tension length, and by means of high-speed circuit breakers in track-sectionalising cabins alongside the track. For crossovers and sidings, the sectionalising is carried out by means of section insulators inserted in the overhead line and controlled by hand-operated switches. All rails of the track are bonded by means of rail bonds welded to the sides of the running rails and by cross bonds between tracks.

#### Locomotives

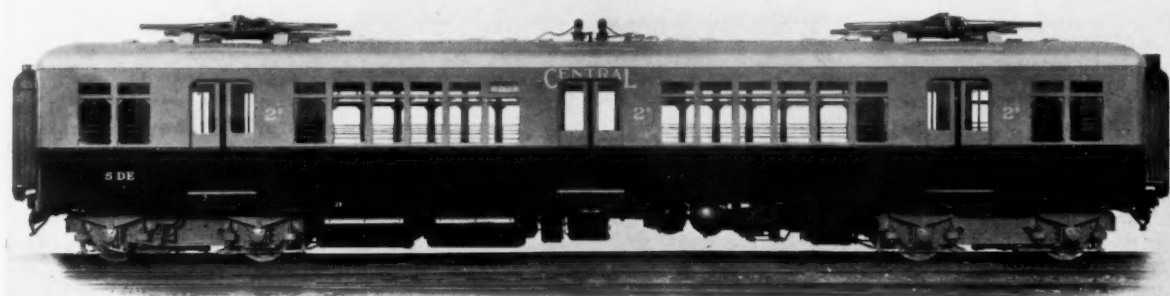
Nine passenger locomotives of the 1-Co + Co-1 type are to be provided; they will weigh about 130 tons in working order and will have a total rating of 2,862 h.p. for one hour and 2,340 h.p. continuous. These locomotives

hailed is 1,000 tons and this will be handled as far as Belém by one locomotive and beyond Belém over the Sierras by two locomotives driven from the leading locomotive, and arranged in multiple-unit.

In addition to these there will be six small locomotives for mixed passenger and freight trains; these will be of the Bo-Bo type weighing about 46 tons, and are to be equipped with four 175 h.p. motors as used for the multiple-unit trains but with different gear ratio. The maximum train weight is 450 tons on the level section but this is to be reduced when going over the Sierras. These locomotives are not to be equipped for regeneration. All the locomotives will be equipped with Westinghouse automatic and straight air brakes.

#### Multiple-Unit Trains

All the suburban electric trains operate on the multiple-unit system; 78 train units, each consisting of one motor-coach and two driving trailers will be provided, of which 60 have been furnished in the first stage of the electrification. The trains can be run as three-, six-, or nine-car sets, but generally it is expected that six-car trains will be used. Each motor-coach is equipped with four 175 h.p. Metro-



*Metro-Cammell 700 h.p. all-steel motor-coach for the Central Railway of Brazil 3,000-volt d.c. system*

tives will be equipped with six nose-suspended motors each of 477 h.p., arranged for field control and for three different strengths of field. As there will be three different motor combinations giving 0.33, 0.66 and full speed, each with three field strengths, there will be nine different economical speeds available. The passenger locomotives will have an articulated coupling between bogies, and each bogie is provided with a pony truck. The maximum service speed is to be 90 km.p.h. (56 m.p.h.) on the more level parts of the railway, with a considerably reduced speed over the Sierra grades. The control will be of the electro-pneumatic type and the locomotives will be provided with regeneration to control the speed going down the Sierras, where heavy grades are encountered. The maximum weight of passenger train to be hauled will be 500 tons and one locomotive is to pull this train over the level portion and also over the Sierras at an average of 45 km.p.h. (28 m.p.h.) without assistance.

There are to be 15 freight locomotives of the Bo-Bo type, each weighing about 76 tons. They will be equipped with four motors each of 395 h.p., and the total power of the locomotive at the one-hour rating will be 1,580 h.p.; the continuous rating will be 1,320 h.p. The motors will be of the nose-suspended type, provided with field control giving three different speeds, and the control will be arranged for series-parallel operation for half and full speed, giving in all six economical speeds. Like the passenger locomotives the freight class will be provided with regenerative braking. The maximum train weight to be

Vick motors, which are of the self-ventilating type provided with field control. The normal make-up of a train is a motor-coach in the middle and a driving trailer at each end, the train being driven from one of the driving trailers, but the motor-coaches themselves also have a driving cab for use in special circumstances.

All the coaches are 65 ft. 7½ in. long, 9 ft. 9 in. wide, and 12 ft. 9½ in. high, and are made entirely of rolled steel sections and pressings of steel, with the exception of doors and seats; the steel used for plates and angles contains not less than 0.25 per cent. of copper, to resist corrosion. The inner surface of the external sheeting is coated with granulated cork to prevent condensation. In 30 of the vehicles the floors are covered with Induroleum laid on galvanised steel keystone section sheets; in the other 30 Decolite has been used. The ceilings are of Sundeala. Alpax sliding window frames are fitted, and on the exterior of each window opening there is a grille to prevent passengers climbing through the opening. Four fans and a large number of Monarch type ventilators are placed in the roof of each car to provide adequate ventilation, and the cars are well lighted by ceiling fittings. The exterior painting is in blue and grey with gold lining and lettering. For the interiors the colour schemes adopted are blue and cream for the first class, and brown and cream for the second class.

First class coaches have sprung seats covered with chrome-treated leather, and second class coaches have seats of wood. All coaches are well provided with strap hangers



*Interior of second class saloon in the Metro-Cammell multiple-unit trains for the suburban electrification out of Rio de Janeiro. The sliding doors on each side are electro-pneumatically operated*

and grab poles. Lighting is by means of electric lamps fitted with translucent shades. Double ceilings  $2\frac{1}{2}$  in. apart are provided, the air layer thus formed being continually renewed when the trains are in motion by six ventilators installed on the roof of each coach. In addition each coach is equipped with four electric ceiling fans. Each three-coach set consists of a first class trailer with 68 seats, a second class motor-coach with 72 seats, and a second class trailer with 72 seats. Ample standing accommodation is provided in both classes, the allowance being 132 first class and 296 second class passengers per three-car set.

On each side of every coach three pairs of aluminium-silicon alloy sliding doors with openings 6 ft. 2 in. high by 3 ft.  $7\frac{1}{2}$  in. wide are provided, together with an additional door at each end, and gangways to the next coach. The sliding doors are operated by compressed air cylinders controlled electro-pneumatically either from the driver's compartment or from the outside of each coach; also each centre door may be operated by an emergency hand lever inside the coach. Gangways between coaches of each three-car unit are of the Pullman type, with collapsible vestibules, the gangways between train units being without vestibules, but having covered safety chains. The couplers between the cars were made by the English Steel Corporation Limited; they have the ARA profile, and are arranged for uncoupling by a rotary movement.

Every trailer coach is fitted at one end with two 100-watt headlights, each with a lens approximately 9 in. in diameter, and two lifeguards of tee section are fitted to the bogie at the driver's end of the trailer coaches. Illuminated destination indicators are fitted on both sides of every coach, and also at one end of every trailer coach.

All bogies are of the built-up type designed to obtain maximum strength with minimum weight. The bolsters rest upon groups of helical springs, and in conjunction with laminated side bearing springs with suspension eyebolts and Spencer's auxiliary rubber springs, are designed to provide easy riding under all conditions of load. Each journal is provided with self-aligning roller bearing axle-boxes of the SKF type. The wheels are 3 ft.  $2\frac{1}{2}$  in. diameter, of Taylor Bros. & Co. Ltd. forged rolled steel solid type, with their tread surface toughened to have a

tensile strength of 63/69 tons per sq. in. Automatic Westinghouse air brakes of the most recent design and operating independently are provided for quick service and emergency braking, gradual release and emergency application being always available although previous applications may have been made. A hand brake is fitted to each car, and arranged for operation from a vertical wheel placed inside near the body end. Each motor-coach is provided with two pantographs on the roof, only one of which normally will be in use. The trains are operated at an acceleration of about 1.8 km.p.h.p.s. (1.1 m.p.h.p.s.) in order to maintain a reasonably high schedule speed with the short distances between stations in the suburban area, and run at about 70 km.p.h. (43.5 m.p.h.) on level track.

#### Electrical Equipment of the Trains

Every motor-coach is equipped with four M-V 155 series-wound traction motors. They are of the four-pole type, with interpoles, and are axle-hung. Ventilation is effected by a fan on the armature shaft, a special feature being that dust and dirt are kept away from the vital parts. The motors are insulated for 3,000 volts to earth, but are designed to work in two pairs, each pair being permanently connected in series across the 3,000-volt supply circuit, and each motor is capable of giving its rated output at a tension of 1,350 volts across the motor. The motors are designed to work with either full or weak field, a tapping being taken from the main field coils for the latter purpose. The weight of one motor complete with gears and gear case is approximately 3 tons, and the one-hour rating of each motor with full field at 1,350 volts is 175 h.p. at 748 r.p.m. The armature bearings are of the roller type, arranged for easy dismantling of the motors without removal of the inner races from the shaft. The axle bearings are split longitudinally, and lubricated from a common oil well by two special wick-syphon lubricators.

The drive from each motor is by a single spur gear with ratio of 18:71, the teeth of both pinions and gear wheels being cut by the generating process. Both gear wheels and pinions are machined from separately forged blanks, which are carburised and water quenched to pro-



duce a very hard case which offers great resistance to abrasive wear. After the hardening treatment the bores of both wheel and pinion are ground concentric with the working profile of the teeth. The gears are enclosed within welded steel cases, made in halves which are fitted together with a packed tongue and groove joint. Taxaco specialised railway lubricants are used for armature bearings, traction gears, &c.

The negative side of the equipment is connected to a terminal in the motor yoke, and from this terminal a short flexible connection is taken to a brush which makes contact under spring pressure with the axle. This arrangement provides a direct path for the current from the equipment to the axle and thence through the wheels to the rails, and so prevents any passage of current through either bearings or gears.

To collect current from the overhead line, two standard Metro-Vick pantographs are mounted on the roof of the motor-coaches, and additional roof gear on each motor-coach includes two main fuses, a three-way isolating switch, a lightning arrester, and a choke coil. The pantographs combine rigid construction with light weight and great strength, and are each supported from the roof by four large porcelain insulators. They are raised and lowered by compressed air in conjunction with powerful springs, so that impact with the overhead wire is made gently, and when lowered the pantographs come to rest on their stops without shock. A working range of 6 ft. 9 in., with an average pressure of 16 lb., is provided to follow differences in level in the overhead wire, and additional spring supports between the pantograph and the collecting pan allow the latter to follow local inequalities in the overhead wire.

The main power fuses have each a replaceable element of tinned copper rod mounted between two heavy flexible copper braids and fitted within a fibre tube. The arc resulting from the destruction of the fusible element is effectively extinguished by the high internal pressure of gases produced during rupture. The pantograph isolating switch is of the three-contact knife blade type mounted on porcelain insulators. The two outer contacts connect either of the pantographs in service, and the centre contact connects the equipment to earth. The switch is operated from rail level by means of a hook stick which is carried on the underframe. The lightning arrester is of the condenser type with a capacity of 0.05 microfarads and for a normal potential of 3,000 volts. It operates in conjunction with a choke coil consisting of 10 turns of copper rod to discharge high voltage surges which otherwise might be liable to damage the equipment.

In order that as much as possible of the floor space in each coach may be available for passenger accommodation, the greater part of the electrical and pneumatic equipment is fixed underneath the coaches, the principal items mounted underneath each motor-coach being a motor-driven air-compressor with storage reservoirs, a motor-generator set, resistances, battery, and the switchgroups.

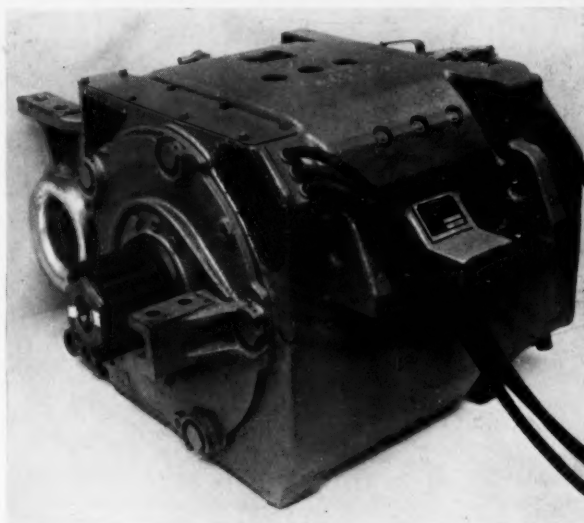
#### Auxiliary Equipment

The compressors are of the duplex horizontal pattern, each driven through double helical gearing by a series-wound 100-volt d.c. motor, and having a displacement of 38 cu. ft. of free air per minute. All the compressors in the train are synchronised and set to start when the air pressure falls to 85 lb. per sq. in. and stop at 100 lb. air pressure.

The Metro-Vick 13 kW. motor-generator set takes d.c. line power at 3,000 volts, while the generator gives a d.c. supply at about 100 volts. The two machines are mounted in a single yoke, and the armatures are built on the same shaft, which is carried in two ball bearings,

so that the machine is of compact design and very light weight. Ventilation is effected by an internal fan, and the cooling air is so directed that all dust and dirt are prevented from reaching vital parts. The complete motor-generator set is fixed with anti-vibration mountings.

The battery is of the Exide Ironclad type, of 35 amp. hr. capacity. It consists of 48 cells arranged in 8 six-cell ebonite containers. The function of the battery is to supply power to the control circuits and for a few lights which are connected to form an emergency lighting circuit. The battery is connected across the terminals of the generator, and supplies power only when the line voltage



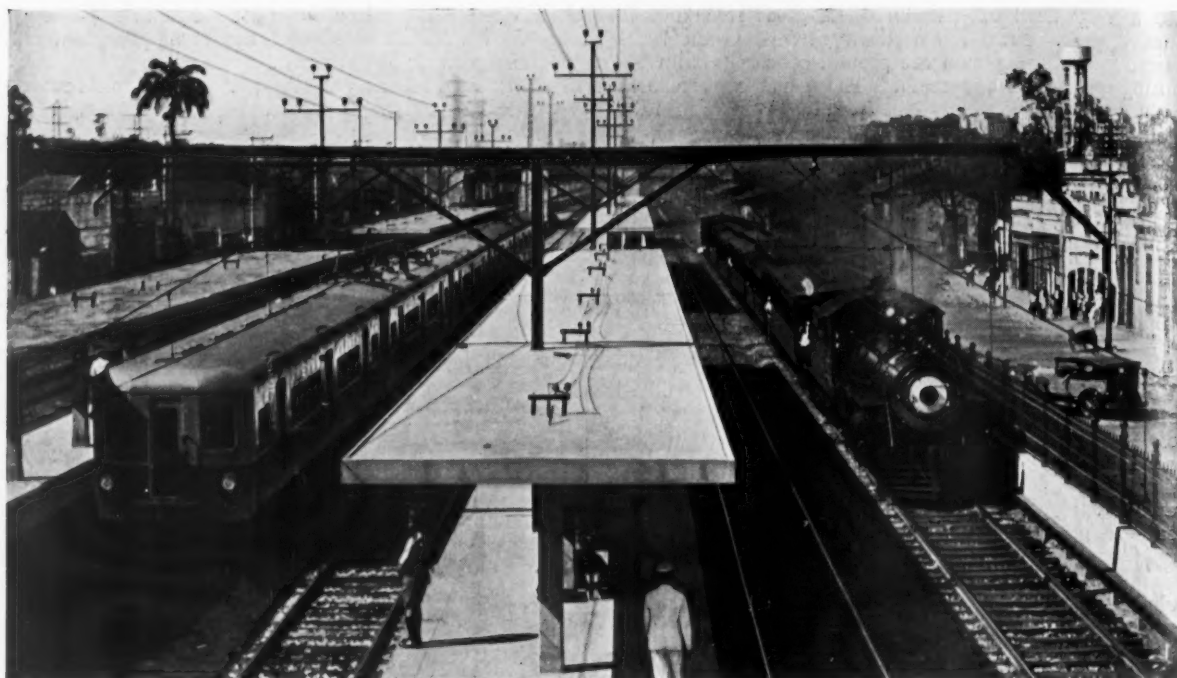
*Metro-Vick 175 h.p. nose-suspended traction motor wound for 1,500 volts*

fails and a reverse current relay is thereby caused to open the generator contactor. The main starting resistance grids are of special unbreakable rustless alloy, mounted between pressed steel end frames upon mica insulated rods, with double insulation between the rods and ground. The current limiting resistance is similar but of cast grids, and mounted in an earthed metal case.

The electro-pneumatic switchgroup cases fitted on each motor-coach are five in number, viz., one containing line switches, one main switchgroup, two motor switchgroups, and one auxiliary switchgroup. All the switchgroups are built up of unit switches, which give the advantage that any unit can be removed and replaced or exchanged without disturbing the remainder. The switch proper consists of a fixed upper contact and a knuckling lower contact, arcing horns, magnetic blow-out coil and plates, and a substantial asbestos arcing chute. The lower contact is coupled by a solid block of insulation to a piston which is fitted, together with a strong spring, in an air cylinder. When compressed air is admitted to the cylinder the piston is raised against the action of the spring and the contacts are held firmly together; when the air pressure is released the spring exerts a force of about 80 lb., which effectively separates the contacts and breaks the circuit.

The supply of compressed air is controlled by a small valve which is held open by a solenoid at the foot of the switch. When the solenoid is de-energised the valve closes and opens the cylinder to exhaust. Auxiliary interlock contacts placed behind and at the foot of the switches are operated by a collar fitted on the piston rod immediately above the air cylinder.

The line switchgroup contains three line switches and



*Suburban electric train running on parallel track to steam train from the outer area, Central Railway of Brazil*

one overload relay. The case is of welded steel, with top and bottom angle iron supports upon which the switches are mounted. The line switches are generally similar to the unit switches, but are of heavier construction, being rated to carry 450 amp. continuously. The three switches are connected in series, one being arranged to open first and thereby insert a resistance in series with the other two, so that the current is ruptured in two stages. The overload relay has two tripping elements connected one in the power circuit of each pair of motors, combined with a master relay which, under an overload, drops to open the control circuit of the line switches and lights a red lamp in the driver's cab until the relay is reset.

The main switch group contains the unit switches, accelerating relay, and weak field relay. It is designed to work with the four motors arranged in pairs, with the armatures and fields of each pair connected permanently in series, and to give four working positions in either forward or reverse, *viz.*, (1) shunting notch, (2) full field series, (3) full field parallel, (4) weak field parallel. The solenoid pattern accelerating relay cuts out the resistance in steps such that the accelerating current is constant, and that acceleration to any speed for which the master controller may be moved is completely automatic.

The master controller is of the drum type, with four operating positions. It is arranged for operation by a fixed main handle and a removable reverse key, and incorporates valuable safety interlocks, *e.g.* :—

(1) The main handle includes a dead-man safety device, consisting of a spring-controlled hinged portion which must be depressed before the controller can be operated. If the main handle be released in an operating position the supply is automatically disconnected, the brakes are applied, and the control circuit cannot be established again until the handle has been moved to the off position.

(2) The main handle cannot be moved into an operating position until the reverse key has been put into either its forward or reverse positions.

(3) The reverse key cannot be moved from its forward or reverse positions to the off position, except with the main handle in the off position.

(4) Provided the main handle and reverse key are both in their off positions, the reverse key can be removed, thus making the main motor control gear inoperative until the key has been restored, it being noted that a reverse key is supplied to only one driver for each train.

The control key switch provides a means whereby all the power control circuits can be cut off. This switch also is operated by a removable key, which like the master controller reverse key, is issued only to one driver for each train, so that as only one switch may be operated at one time there is no likelihood of the batteries and generators of two or more coaches becoming paralleled. Moreover, if a driver opens his control key switch and leaves his train, taking both removable keys with him, control by unauthorised persons is entirely prevented.

#### Signalling

The power signalling installation consists of both controlled and automatic sections. For the first stage of the contract, all-electric locking frames controlling power-operated points and signals have been installed at four of the principal stations. At other stations mechanical locking frames are used, the levers being electrically locked and controlling mechanically-operated points and shunt signals, but electric main-line signals. Automatic signalling is installed between signal cabins.

Throughout the system, a.c. track-circuits using vane relays are being employed. The main three-aspect colour-light signals are of searchlight pattern and many of these operate in conjunction with electric train stops. The majority of the shunt signals are also of the colour-light type controlled from the signal cabins. Illuminated diagrams are provided; there are relay rooms in each cabin and in addition welded steel weatherproof cases placed along the track house additional apparatus such as relays, transformers, and condensers.